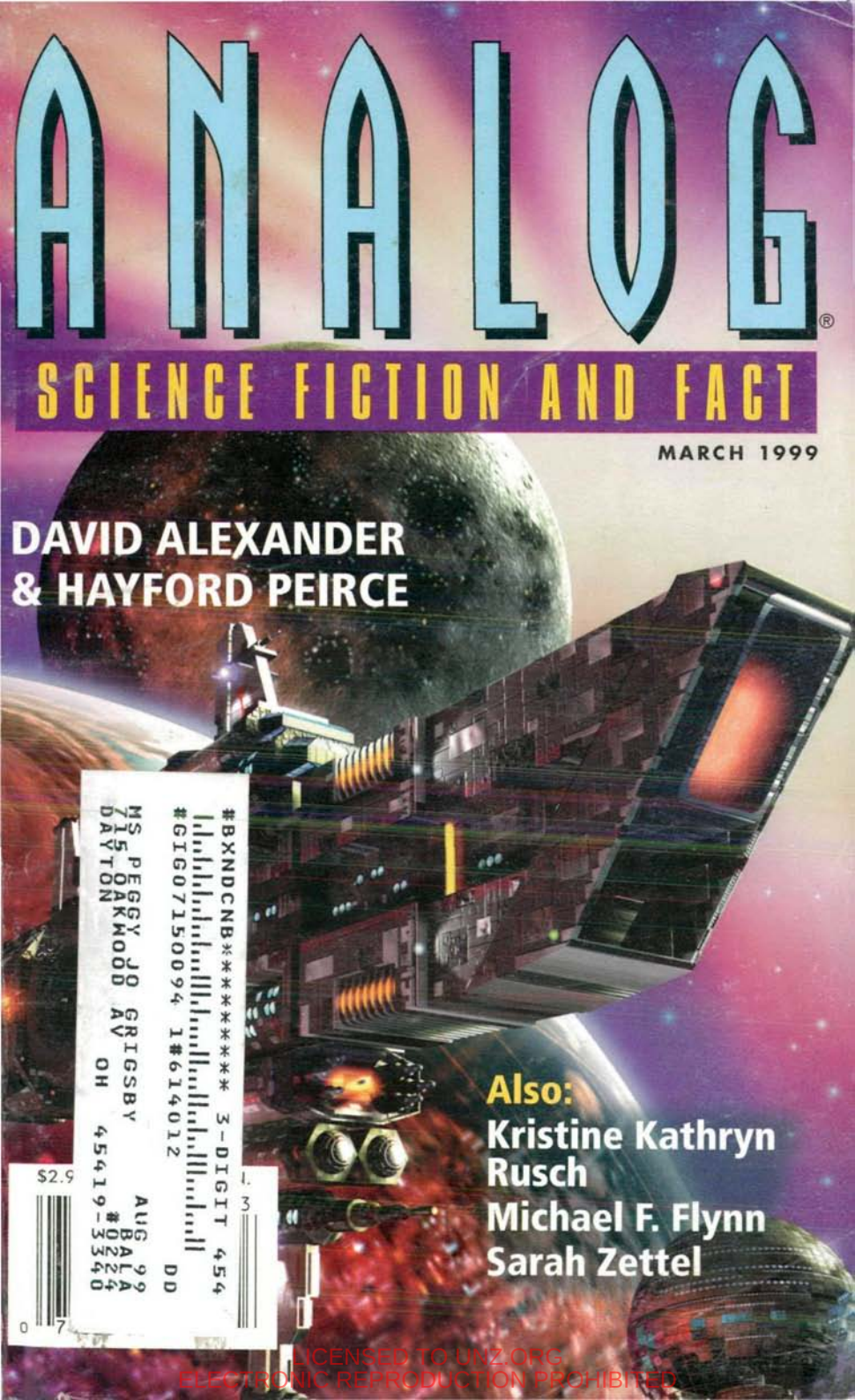
ANALOG®

SCIENCE FICTION AND FACT

MARCH 1999

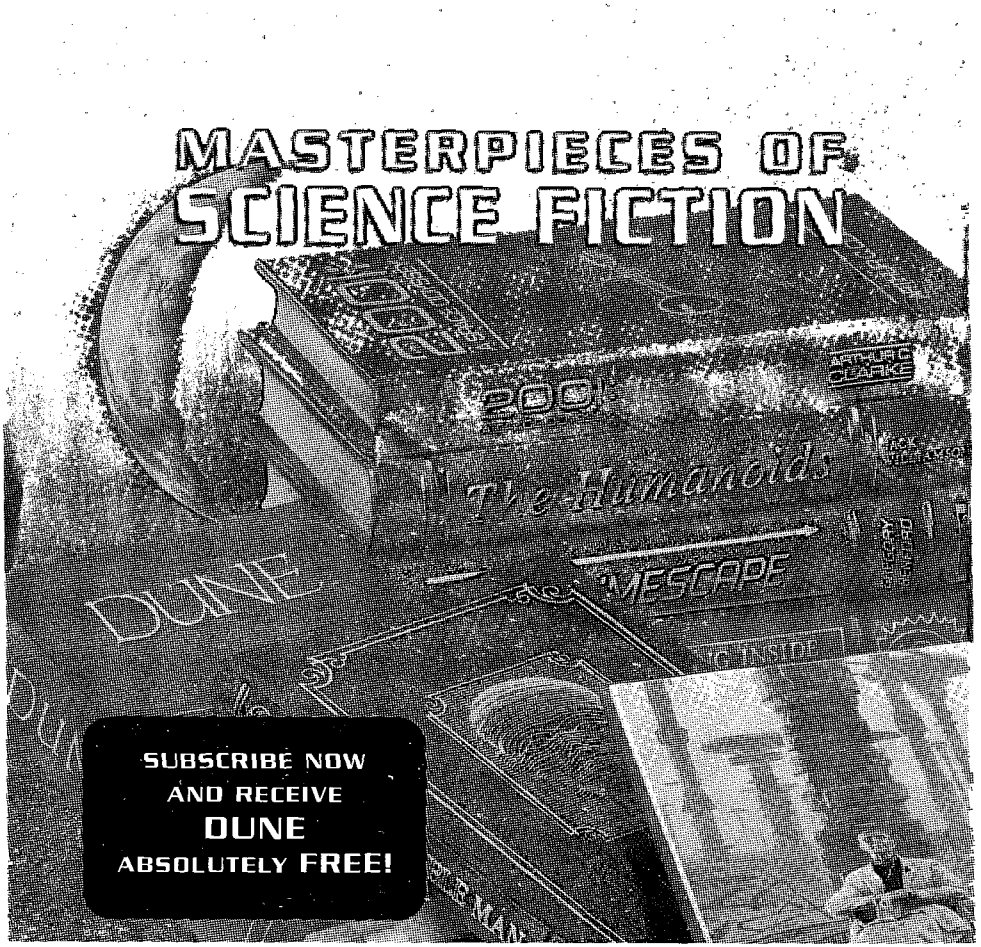
DAVID ALEXANDER & HAYFORD PEIRCE



Also:
Kristine Kathryn Rusch
Michael F. Flynn
Sarah Zettel

#BXNDCNB********** 3-DIGIT 454
#GIG071500994 1#614012
MS PEGGY JO GRIGSBY DD
715 OAKWOOD AV
DAYTON OH 45419-3240
AUG 99
BALA
#0224
$2.9
0 7

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Behold . . . the ultimate library of science-fiction classics! The greatest masterpieces by the greatest science-fiction writers are now being issued in luxurious leather-bound collector's editions. Timeless works bound in genuine leather to be read again and again . . . and to be treasured for generations.

A complete collection - from early classics to recent award winners!

The Masterpieces of Science Fiction comprises the entire history of the genre, from works by Jules Verne, H.G. Wells, and Edgar Rice Burroughs to more recent classics by Isaac Asimov, Gregory Benford, Robert Heinlein, Ursula K. Le Guin, David Brin, Stephen King, Joe Haldeman, Philip K. Dick, and Alfred Bester, to name a few.

There are splendid editions of Arthur C. Clarke's *2001: A Space Odyssey* . . . Frank Herbert's *Dune* . . . Larry Niven's *Ringworld* . . . Fred Hoyle's *The Black Cloud* . . . John Wyndham's *The Day of the Triffids* and Philip José Farmer's *To Your Scattered Bodies Go* Many of the works included have received the prestigious Hugo Award, Nebula Award . . . or both!

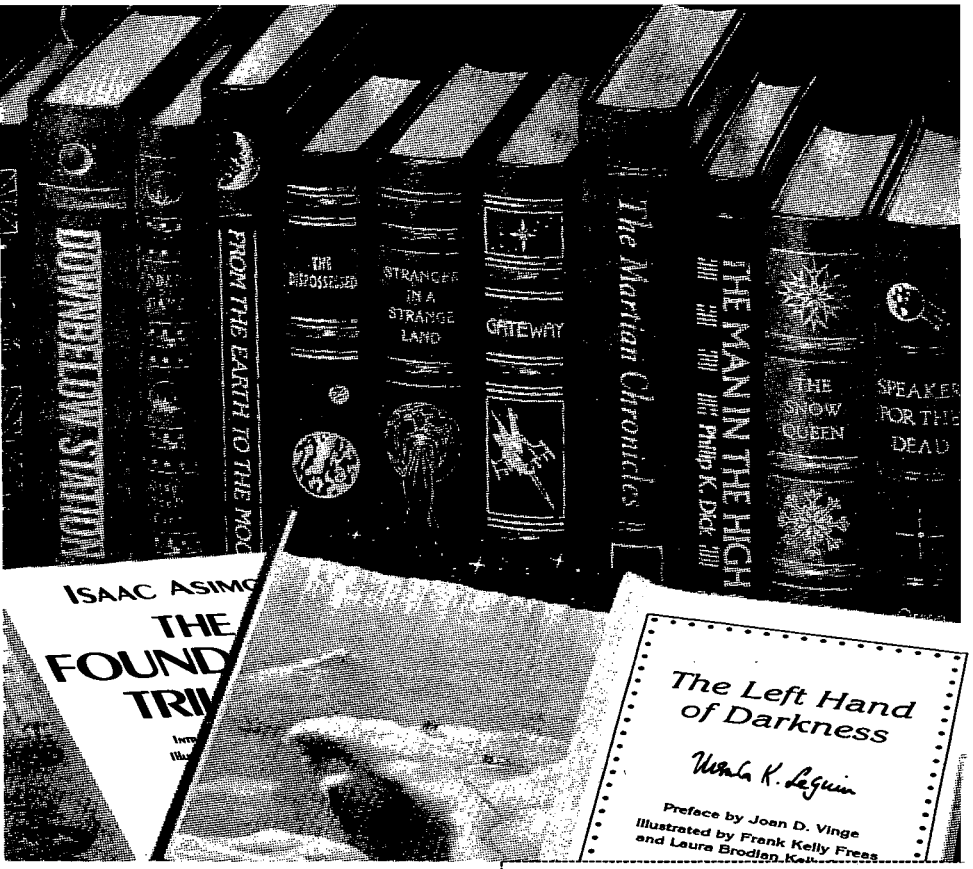
Personally-signed editions of six important works.

Recognizing the importance of this collection, six of the greatest science-fiction writers have agreed to sign their masterpieces. Ray Bradbury signed *The Martian Chronicles* Frederik Pohl, *Gateway*, Orson Scott Card, *Ender's Game* Ursula K. Le Guin, *The Left Hand of Darkness*, Robert Silverberg, *Dying Inside* and Anne McCaffrey, *Dragonflight* These extraordinary volumes will surely be among your most prized possessions. (And due to their limited supply you should act promptly to avoid disappointment.)

Each edition is truly a masterpiece!

Each leather-bound masterpiece is accented with 22kt gold and features superb artwork by the masters of the genre including

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Richard Powers, Vincent DiFate and Michael Whelan. The pages are printed on archival-quality paper and are gilded on three sides for added beauty and durability.

Convenient acquisition.

The Masterpieces of Science Fiction is available only by advance reservation directly from Easton Press. Your books will be sent at the rate of one per month for just $39.50 per volume, plus shipping and handling. This favorable price is guaranteed for the next two full years. Your satisfaction is guaranteed: you may return any volume within 30 days for a full refund; and you may cancel your subscription at any time. To reserve your collection, simply complete the Reservation Application and mail it today!

CALL TOLL-FREE: 1-800-367-4534

Easton Press • 47 Richards Avenue • Norwalk, CT 06857

067-910

Advance Reservation Application

MASTERPIECES OF SCIENCE FICTION

Easton Press
47 Richards Avenue
Norwalk, CT 06857

Call Toll-Free: 1-800-367-4534
Extension 067-910
Mon.-Fri. 8:30 a.m.-6 p.m. Eastern Time

Please send me the first volume in *Masterpieces of Science Fiction* and reserve a collection in my name. Future volumes will be sent at the rate of one book per month at $39.50 each (plus $4.25 per book for shipping and handling)*. This price will be guaranteed to me for the next two full years. I understand that I may return any book within 30 days for a complete refund and that either party may cancel this subscription at any time.

☐ Please charge each monthly shipment to my credit card:

☐ VISA ☐ MasterCard ☐ Discover ☐ Am. Ex.

Card No. _____ Expiration Date _____

☐ As a convenience, I wish to pay for my first volume now. I am enclosing $43.75 (includes shipping and handling)* payable to Easton Press.

Name _____

Address _____

City _____ State _____ Zip _____

Signature _____
(All applications subject to acceptance)

*Applicable sales tax will be billed with shipment.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

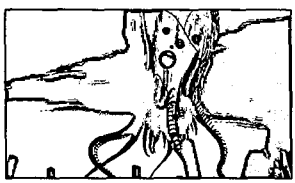
ANALOG

SCIENCE FICTION AND FACT

Vol. CXIX No. 3
March 1999

Next Issue on Sale
March 2, 1999

116



10

NOVELLA

ELEPHANTS' GRAVEYARD, David Alexander and Hayford Peirce ____ 10

NOVELETTES

FLOWERS AND THE LAST HURRAH, Kristine Kathryn Rusch ____ 52
THE HOST OF THE AIR, Rick Cook ____ 116

SCIENCE FACT

THE LOST GENERATION OF FIBER OPTICS, Jeff Hecht ____ 42

SHORT STORIES

FLAME OF IRON, Michael F. Flynn ____ 72
UPGRADE, Ramona Louise Wheeler ____ 82
IMAGE OF AN IMPERFECT GOD, Shane Tourtellotte ____ 96
MEANS OF SURVIVAL, Sarah Zettel ____ 104

READER'S DEPARTMENTS

THE EDITOR'S PAGE ____ 4
IN TIMES TO COME ____ 80
THE ALTERNATE VIEW, John G. Cramer ____ 92
THE REFERENCE LIBRARY, Tom Easton ____ 132
BRASS TACKS ____ 138
UPCOMING EVENTS, Anthony Lewis ____ 144

Stanley Schmidt Editor
Cover design by Victoria Green

Daniel Imal Associate Editor
Cover Art by George H. Krauter

Indicia on Page 5

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Be the first on your planet to get one....

Only available at
www.crowbook.com

"An inspiring story of the heroism and self-sacrifice of those who have been among the best of us. It reminds us of who we are and how we came to be—and what we may yet become."
- *Global Village Voice*

"The most readable history ever...feels like a work of fiction."
- *Cosmos Quarterly Men's Magazine*

Pelagian Press

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

EDITORIAL Stanley Schmidt

MUCH ADO ABOUT VERY LITTLE

First (though not really) there was the O. J. Simpson trial. Later there were Bill Clinton and Monica Lewinsky. By the time you read this, who knows? But I'm quite confident that there will be some lurid scandal consuming far more public attention and money than it deserves.

Don't worry; I'm not going to assail you with still more sordid details of any of those Shenanigans of the Rich and Famous. I couldn't if I wanted to; I haven't paid that much attention to them. I'm not personally interested in them, and they have, in themselves, no real significance to the country at large.

What does interest me, and may have several layers of significance (none of them good), is the recent tendency to spend disproportionately vast amounts of public attention—and money—on personal affairs and misdeeds of the rich and famous, which mostly means politicians and entertainment stars. Interest in such things is not, of course, anything new; scandal sheets are probably far older than paper. But the tendency to obsess over them has almost certainly been exacerbated by two recent phenomena. One is technological: the ubiquity and instantaneity of modern news media. The other is social: the current mania for aggressive self-righteousness.

That mania may well be, at least in part, yet another manifestation of the weird determination we've seen to fill the "vacuum" left by the end of the Cold War. Without a clear threat from a Big Bad Outside Enemy, a great many people seem to feel a powerful compulsion to find or invent new enemies to worry about and feel superior to, and other people's misdeeds will serve as well as anything else. Anyway, for whatever reason, we are lately plagued with hordes of people who are very, very concerned with holding other people—especially highly visible ones—to very high standards of behavior. (Imagine what a world we might have if they all devoted that much effort to improving their *own* behavior!)

I must hasten to add, before the inevitable misconstructions begin, that I am *not* endorsing bad behavior. Murder and infidelity are *not* all right, and they are by no means trivial matters for the people involved in them. They are quite rightly regarded as very serious matters—crises in the truest sense of the word—at least at the family level, and in some cases at the local government level. But they are *not* matters of national importance.

For many months it often seemed that most of the nation's attention, and in particular, that of the government itself, was focused on the most intimate details of presidential hanky-panky. Yet those were never, by any reasonable stretch of the imagination, the most important problems facing the nation.

"But this is the *president*!" you say, and I say, "So what?" The president is just a man hired to do a job. That seems to be a hard concept for Americans to grasp. We *talk* a lot about equality, but in practice we treat politicians and sports stars like royalty. Radical suggestion: Let's try acting as if we really *believe* in equality.

Nobody is special enough to warrant

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

that much attention and special treatment, and no job so special that we have to keep its occupant on a public microscope stage at all times. Let's try to remember that a public servant is just that: a person hired to do a job. If we are conscientious employers, we must have some idea of what constitutes satisfactory performance of that job. If he provides such performance, let's keep him in the job*. If he doesn't, let's get rid of him—for doing a bad job, not for having unsavory personal habits. If he commits criminal or civil offenses that have nothing to do with his job, let them be handled exactly as they would for any other citizen—with no more or less fanfare or expense, and without confusing them with performance or nonperformance of his job.

You may think that watching and following media circuses like the Simpson trial and the Starr investigations is a harmless hobby, but I'm not so sure. I can easily think of at least three ways in which the obsession we've seen with such things may represent a more serious problem than the subject of any of the investigations:

1. *It distracts too much attention and resources, both public and private, from more important things.* When I think of the money that has been spent on these investigations, and the amount of time jurors have been kept away from their *real* jobs and lives, and the amounts of paper and newsprint and electricity consumed to spread information and speculation about them, I must have serious doubts. As a taxpayer, I must wonder: Am I getting my money's worth for what I've been forced to spend on this? I haven't seen much evidence that I have.

The sordid details of a president's life are *not* of national importance. We're told that his lying about them is, and there's some truth in that—but then, how many of you actually believe *any* politician can be trusted to tell the truth all the time? Admittedly the president himself must bear a sizable part of the blame for wasting court time by not telling the truth in the first place, but should he even have been asked and required to answer these questions in such a deafeningly public way?

Which leads to the second problem I see:

2. *How much* right *do we have to require our employees to lead impeccable personal lives?* Notice that I couched this in terms of employees generally instead of "public servants." Demanding personal infallibility of people in public jobs could easily set a precedent for imposing puritanical standards on people in *all* kinds of jobs, including yours and mine. We have already seen

* I hereby serve notice that I'm using "he" to mean "he or she" throughout this discussion, because repeating that clunky phrase every few lines gets really tedious and interferes with the flow of the argument.

Analog Science Fiction and Fact (Astounding) is published monthly except for a combined July/August double issue by Dell Magazines, a division of Crosstown Publications. One-year subscription for $33.97 in the U.S.A. and possessions, in all other countries, $41.97 (GST included in Canada, GST # 123054108) payable in advance in U.S. funds. First copy of new subscription will be mailed within eight weeks of receipt of order. When reporting change of address allow 6 to 8 weeks and give new address as well as the old address as it appears on the last label. Periodical postage paid at New York, NY, and at additional mailing offices. Canadian postage paid at Windsor, Ontario. Canada Post International Publications Mail, Product Sales Agreement No. 260622. © 1999 by Dell Magazines, a division of Crosstown Publications, all rights reserved. Protection secured under the Universal Copyright Convention. Reproduction or use of editorial or pictorial content in any manner without express permission is prohibited. All stories in this magazine are fiction. No actual persons are designated by name or character. Any similarity is coincidental. All submissions must be accompanied by stamped self-addressed envelope, the publisher assumes no responsibility for unsolicited manuscripts or artwork. USPS 488-910, ISSN 1059-2113

POSTMASTER: Send change of address to: ANALOG SCIENCE FICTION AND FACT
P.O. Box 54625, Boulder, CO 80328-4625.

IN CANADA RETURN TO: 3255 WYANDOTTE STREET EAST, WINDSOR, ONT. CANADA N8Y 1E9
Editorial and Advertising: Analog Science Fiction and Fact, 475 Park Avenue South, New York, N.Y. 10016
Subscriptions: Analog Science Fiction and Fact, P.O. Box 54027, Boulder, CO 80322-4027

Printed in Canada

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

disturbing steps in this direction, such as companies demanding that their employees not smoke even in the privacy of their own homes.

Many people simply could not withstand this kind of scrutiny, although, contrary to popular belief, many could. People of high moral character do exist; they just don't make headlines or gossip columns.

What's far more important than how many people could meet the standards, in a country that calls itself the land of the free, is that nobody—public or private—should have to. Enforcing rigid standards of off-duty personal conduct necessarily involves round-the-clock snooping. Once you start making excuses for that, can Big Brother be far behind? Some things simply aren't anybody's business except the people involved. If we want "land of the free" to be more than an empty phrase, we'd better start acting as if we believed that.

Finally, there's the purely practical question of whether demanding Personal Purity will be more help or hindrance to the quest for good government:

3. *Requiring our servants to be above reproach in their personal lives may sometimes interfere with getting or keeping people who can do a good job.* If your plumbing is leaking all over your house, a highly skilled scalawag is far more valuable to you than a saint who doesn't know a washer from a washcloth. The same principle applies, in some way and to some degree, to *any* job you need done.

At the end of July (1998), Gannett newspapers carried an interesting essay in which historian Ken Burns speculated on which past presidents could have withstood the kind of media scrutiny today's public figures are routinely subjected to. Personal foibles—affairs, physical weaknesses, socially unpopular habits, etc.—are by no means new. What's new is the degree to which media instantly pounce on them, blab them all over the country, and pass judgment on them.

According to Burns, many crucial figures in history probably could not be elected, or would risk impeachment, in today's climate of media hyperattention and public holier-than-thou self-righteousness. Thomas Jefferson and Abraham Lincoln had poor speaking voices; Lincoln was not the least bit telegenic. Jefferson was often in debt, kept slaves, and may have had an affair with one of them. Lincoln liked dirty jokes and was

STANLEY SCHMIDT .....Editor
SHEILA WILLIAMS .....Managing Editor
DANIEL IMAL .....Associate Editor
JOHN KLIMA.....Editorial Assistant
DANA THOMAS .....Editorial Assistant
SUSAN KENDRIOSKI.....Executive Director, Art & Production
VICTORIA GREEN .....Senior Art Director
SHIRLEY CHAN LEVI.....Assistant Art Director
CAROLE DIXON.....Production Manager
ABBY BROWNING.....Manager, Subsidiary Rights and Marketing
SCOTT LAIS.....Contracts & Permissions
BRUCE W. SHERBOW .....Director of Newsstand Sales
SANDY MARLOWE .....Circulation Services
CHRISTINE BEGLEY.....Associate Publisher

Published since 1930

PETER KANTER
Publisher

ADVERTISING REPRESENTATIVE
David Geller Publishers' Rep.
(212) 682-1540

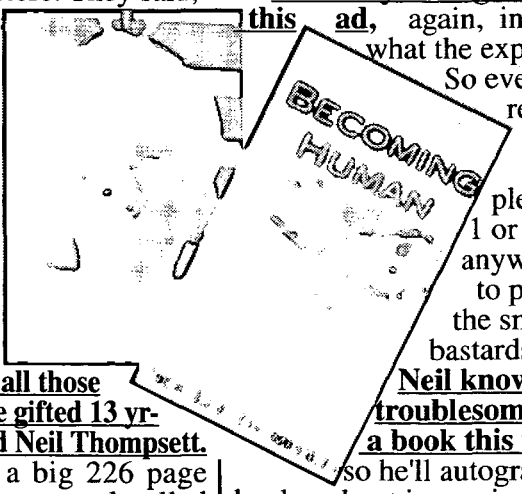
First issue of Astounding January 1930 ©

EDITORIAL CORRESPONDENCE ONLY
analogsf@erols.com

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

All the experts say that you're too bloody stupid to buy this book

The experts said don't bother running this ad. They said you are a herd animal. You'll only buy a book if everybody else is buying it. Only if it's from a major publisher or it's in a big bookstore. They said, even if you w[illegible] buy this book you are just too stupid to figure out how to buy it from this ad, because there is no coupon or no big 800 number in it.



Standing alone, against all those experts, is one gifted 13 yr-old boy named Neil Thompsett. He's written a big 226 page Science Fiction novel called Becoming Human. And it really is quite remarkable. Fast. Smart. Cool Insightful. And truly fresh and original. In spite of his young age. And in spite of his having a serious learning disability. And, most of all, in spite of what all the musty old experts said he couldn't do.

He's only selling it through this ad, again, in spite of what the experts say. So even if you really are bloody stupid, please buy 1 or 2 books anyway - just to prove all the smug old bastards wrong. **Neil knows it's troublesome to buy a book this way** and so he'll autograph the book and put in any inscription you want. But order today. He's getting famous quickly -and he won't be this nice for very long.

Send $8 to NOGGIN: Galactic Headquarters - 239 South Robertson Blvd, Penthouse Suite 880, Beverly Hills CA 90211

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

prone to depression, and had a wife who was eventually institutionalized. Franklin Delano Roosevelt was physically handicapped and had an affair with his wife's social secretary.

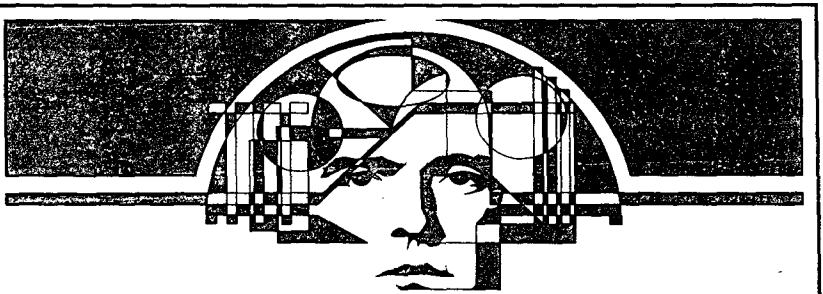
Burns listed several more juicy tidbits about these and other individuals, and concluded that while Washington would do fine in any era (so far), Jefferson, both Teddy and Franklin D. Roosevelt, and Woodrow Wilson would not; while John F. Kennedy's chances would be about the same as Bill Clinton's. "Obviously," Burns wrote, "we could not have survived as the great country we are without these great, but clearly flawed individuals. But it's not clear these great individuals could have survived our current scandal-addicted media. Like the sanctimonious village elders of Colonial America, we love to stitch a scarlet 'A' on all the less-than-perfect among us. . . .

"What's needed is restraint. Not every flaw is character-defining, not every mistake a crime. Sometimes personal attributes have no bearing on public performance. Sometimes entertainment or knee-jerk criticism is not news."

Now—how do we get "restraint" from the media, and from the gossip-hungry mobs who feed on what they dish out? It won't be easy, as long as the media continue to feed on this drivel and the public continues to encourage them. We can't tell them they *can't* keep acting as they have without getting into really serious problems with freedom of speech. Restraint, if it's ever going to come, will have to come from the men and women who *are* the media. We can only hope, perhaps quixotically, that someday they might grow up and simply refuse to carry, or at least reduce the emphasis on, sordid gossip of no real importance—even if their competitors are still doing it.

And for the many members of the public who spend months obsessing over the sordid details of some celebrity's personal affairs, my advice is even simpler:

Get a life. ■



www.analogsf.com

Visit our website to see what's coming up in future issues. You'll find sneak previews of articles and stories, as well as book reviews, editorials, Upcoming Events, and our on-line forum, where you can communicate with other *Analog* readers from anywhere in the world. You can e-mail comments to us directly at **analogsf@erols.com**.

Don't miss *Analog* and *Asimov's* co-hosted chats with the Sci-fi Channel at **www.scifi.com/chat** (or link to the chats via our home page **www.analogsf.com**). Chats will be moderated by **Gardner Dozois**.

Mars Panel: Translating Science Fiction into Reality
with **Kim Stanley Robinson** and **Geoffrey A. Landis**
February 9, 1999 @ 9:00 p.m. EST

Walter Jon Williams February 23, 1999 @ 9:00 p.m. EST

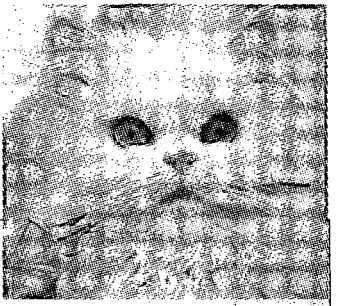
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Is It Okay to KISS YOUR CAT?

New Book Reveals

277 SECRETS YOUR CAT WANTS YOU TO KNOW

Handy Tips...Expert Advice... Amazing Facts...*Information You Won't Find Anywhere Else!*

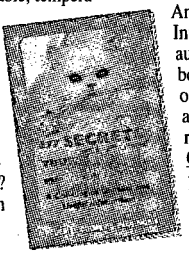


NEW CAT SECRETS BOOK ANSWERS ALL THESE QUESTIONS --AND MORE

• How to get your cat to love you more • What to do about those litter box mishaps • Your cat's embarrassing habits--what's a person to do? • Prozac--is it okay for cats? • Is your cat "kinky" • Which people foods are dangerous for cats? • 8 weird things cats eat or lick • Could cats be psychic? • 15 things that stop your cat from misbehaving • Kitty sex and romance--remarkable true facts • Foods your cat secretly likes best • How to talk to your cat--and what your cat is saying to you • Household hazards--what to watch out for • What shots are good--and bad? • Good news for people allergic to cats • Dangerous plants, indoors and out • How to get kitty to stop waking you up • Stopping cats from spraying, scratching the furniture, and other No-No's • How to outsmart finicky eaters • Save $$ on food, toys, litter, vet bills and more • Believe it or not... a fantastic "youth pill" for older cats • Do cats go to heaven? • Can your cat watch TV? • Saving your cat's life • How to make your cat a more loving "people cat" • Pure pleasure: best ways to pet, tickle, snuggle and massage Fluffy • and much more

How You And Your Kitty Can Enjoy Each Other Even More

Psst! It's here... 277 secrets you didn't know about living with those adorable, temperamental, mysterious felines. 277 Secrets Your Cat Wants You To Know is a treasure trove of fun... surprising little known facts... and useful advice on everything from litter box dilemmas to life-saving techniques. How can you help Kitty be less lonesome when you're away? What household hazards should you watch out for? What are some great sources of free help and advice? No habit is too quirky, no problem too embarrassing. Just turn to this savvy guidebook for tons of useful, ingenious solutions.



Funny, Practical, Absolutely Unique...

An Amazing Source Of Useful, Hard-To-Find Information. Created by award-winning authors Paulette Cooper and Paul Noble, this book is based on the experiences of hundreds of cat owners and experts. Written with humor and carefully researched, it is a truly grrrreat read from beginning to end. 277 Secrets Your Cat Wants You To Know is an easy-to-read paperback, over 200 pages. Order today... Your cat will purr a "Thank you"!

30-DAY MONEY BACK GUARANTEE

For Fastest Service Call Toll-Free **1-800-981-7071** ***Mon.-Fri. 9-5 E.S.T.***

Abigail's Treasures, Dept. CAN40, PO Box 66, Avon-By-The-Sea, NJ 07717

YES! Please do rush my **Cat Book(s)** on a 30-day money-back guarantee.

❑ One Book for only $12.95 plus $2.50 postage and handling.
❑ **Fabulous Gift Idea!** Two for only $24.90 plus $4.50 P&H.

Charge to my: ❑ Visa ❑ MasterCard ❑ AM EX

Account No._____ Exp. Date_____

Enclosed is $_____(NJ res. please add sales tax)

NAME ❑ Mr. ❑ Mrs. ❑ Ms._____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

Please make check/M.O. payable to Abigail's Treasures.
To help process your order you may wish to include your daytime phone number (_____)

Please allow up to 4-6 weeks for delivery. ©1998

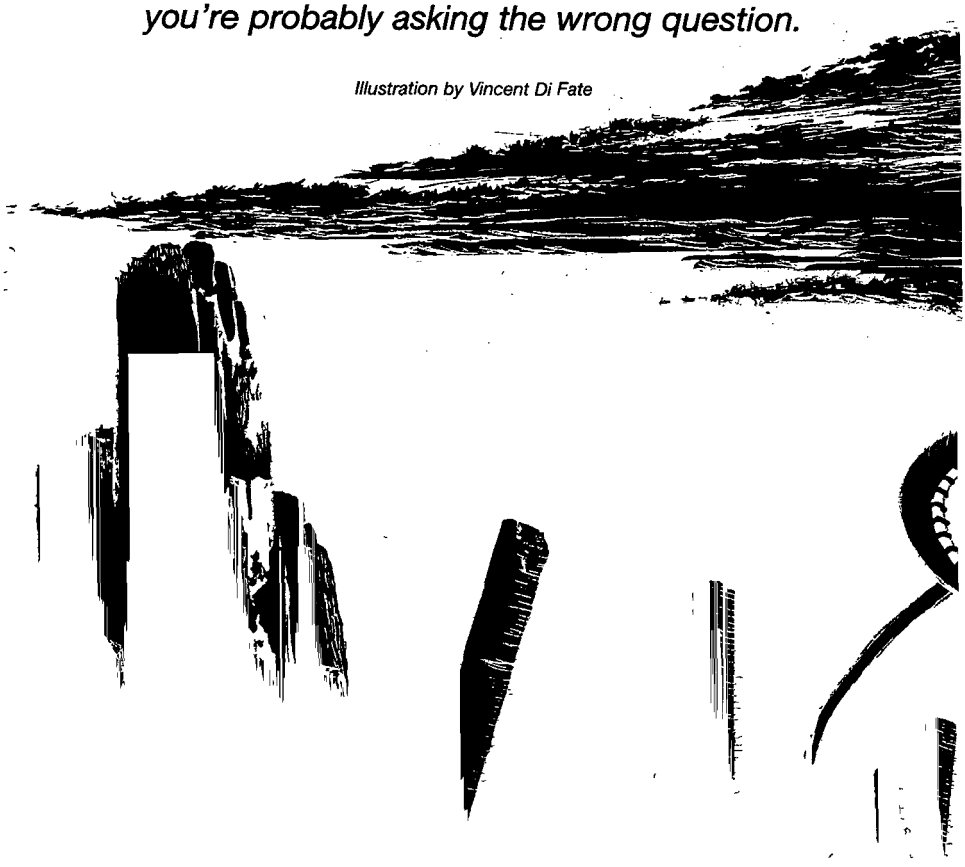
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

David Alexander &
Hayford Peirce

ELEPHANTS' GRAVEYARD

When none of the answers make sense,
you're probably asking the wrong question.

Illustration by Vincent Di Fate



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNIGRE
ELECTRONIC REPRODUCTION PROHIBITED

A dazzling yellow-white bolt sizzled across the sky five hundred yards in front of the *Venture*, then guttered out as we continued our barely controlled dive toward the planet's surface. For a moment the image of a small craft seemed to flicker on the main screen, then faded away.

"Ship, is there another craft out there?"

"Not at the present time."

"Was a craft near us within the last thirty seconds?"

"My instruments registered a craft of unknown type for one-point-one seconds but lost contact with it in a way that could mean the image was a sensor malfunction."

I was about to question the computer more closely when the ship lurched violently and seemed to vibrate in sympathetic rhythm to the peals of thunder picked up by her exterior microphones. Another flash brightened my main display, turning a tower of rain into a flickering silver mesh as if we were dropping through a school of darting minnows in an underwater grotto.

"Are we still on course for the landing field?" I shouted to the AI over the thunder and the crackle of lightning bolts striking the *Venture*'s hull.

"Descent is proceeding within three percent of optimal," the synthesized voice responded evenly.

I gritted my teeth. Guiding an object the mass of a star freighter through a gravity well was difficult enough without adding ten miles of wind, rain, thunder, and lightning to it—especially when your destination is little more than a darkened meadow tagged by a couple of ultrahigh-frequency transmitters.

But at least there was a landing field, no matter how primitive. If Valhalla had been completely uninhabited, right now I would be counting the weeks of life remaining to me on the fingers of my two hands.

The *Venture* gave a lurch violent enough to snap my head against the command chair and a loud crash sounded from the tiny salon just beyond the control cabin. I began to wonder if I shouldn't now be counting the *seconds* remaining in my life. The ship shuddered violently twice more, then slowed, stabilized, and vibrated to the deployment of her landing stabilizers. A moment later the descent engine powered down to inaudibility. On the main display I could see only a swirling gray-black blur occasionally pulsed white by flickering electric bolts.

We were down.

"Ship, are there indications of humans nearby?"

"Yes. Approximately three hundred yards to the west-northwest from our present position are twenty-two single-story auto-erected structures of contemporary human manufacture."

"How long until local sunrise?"

"Approximately four hours and nineteen minutes."

"Monitor all sensors for any signs of visitors. Wake me two hours after local sunrise." I made my way on shaky legs to my bunk. All in all I had little to complain about. The ship was down in one piece on an inhabited planet, a vast improvement over the situation of only a few minutes ago.

Now all I had to do was repair her drive and get out of here in time to earn enough solvency to meet the *Venture*'s next mortgage payment—or else lose my life along with my ship.

A noise that I groggily realized was the sound of something beating against the *Venture*'s hull yanked me from a dreamless sleep.

"Ship, what's that? And what time is it?"

"It is twenty-two minutes past sunrise. The noise I surmise you are referring to is that created by human beings pounding against the hull with digging implements."

"Someone's pounding on the hull with shovels?" I shook my head blearily. "Are they doing any damage?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"None that I have been able to detect."

"Give them thirty seconds of the take-off siren. If that doesn't back them off, shake the ship enough to make it look as if we're going to fry them."

On the tiny monitor above the wash basin I had the satisfaction of watching a motley crowd of bizarrely dressed humans drop their shovels and run desperately for safety. "Maybe that'll teach them to give the next ship a more civilized welcome," I grumbled.

"Did they try to communicate by means other than shovels?" I asked as I headed for the main hatch.

"I detected various radio wavelengths, but with the disturbed atmospheric conditions, I received no useful data."

"So their next choice was shovels? Strange."

The *Venture*'s boarding ramp descended through the misty air and splashed to a halt on the puddle-strewn field. Moments later I was sloshing across Valhalla's surface. Constant flickers of lightning lit the churning clouds and an occasional gust of rain lashed my face. About three hundred yards ahead of me was the settlement—the small cluster of domelike shelters the ship had detected the night before. An eight-legged swastika was emblazoned on the roof of the largest structure. At the periphery of the landing field seven men and women glared at me from behind two small aircars. Behind them huddled a crowd of several dozen more. All of them wore an eclectic mélange of clothing that would have done a rag collector proud.

"This is a restricted planet," declared a muscle-laden Valkyrie as I neared the aircars. Her long, silky blonde braids and barrel-like body made her a perfect match for a planet named Valhalla. "What do you mean by intruding on our sanctuary, then threatening us with your engines?" Like her companions, the faded red garment that stretched across her imposing bosom sported a black, eight-legged swastika framed inside a yellow circle.

"Isaiah Howe at your service, madam," I replied, nodding formally. "You are . . . ?"

"Glaxia Fortinay. I'm an executive Mandator of this planet's establishment, and I hereby order you to remove yourself at once."

I considered her words. "A Mandator, but not *the* Mandator?"

"Mandator enough for the likes of you." The Valkyrie's pale lips tightened in anger. "Now get out of here immediately!"

I turned to a short, stocky woman whose head was dominated by an enormous beehive of tangled copper-red hair that reduced her thin face to comparative insignificance. "There is some other Mandator on this planet?"

"Well . . ." Tiny black eyes stared at me like raisins in a soggy rice pudding and her voice was uncertain. "Dr. Horvath is the—"

"Be quiet, Imelino," Fortinay snapped. "This is my affair to handle, not yours. I—"

"But Dr. Horvath *is* the Mandator General, Glaxia," interrupted one of the men in a sulky voice. Tall and pear-shaped, with a prominent nose and watery blue eyes, he wore a threadbare black coat that made him look like a caricature of a mortician. "Whatever you may think about who ought to be Mandator . . ."

A long silence ensued while Glaxia Fortinay turned her angry glare from me to her companions. Evidently her high opinion of herself was not universally shared.

I spoke in my most reasonable tones. "My ship unexpectedly developed a mechanical problem and when we came out of nullspace yours was the only planet available for an emergency landing. Believe me, I have no more desire to be here than you have to receive me." I stepped forward to hand out business cards.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"What does this mean?" Fortinay demanded suspiciously. "*Come now, and let us reason together?*"

"My credo when I was a Senior Facilitator. In spite of a change in profession, I still prefer to solve problems with reason rather than more direct means of persuasion."

Glaxia Fortinay swept a baleful glance over the other members of her group. "It appears we have no choice but to permit your ship to occupy our landing field until you effect your repairs. What do you know about my . . . our organization?"

"I know very little about this planet. I understand there's a sentient, possibly even intelligent, local species of some exobiological interest and that you are members of the Octavian Society. You've been granted a five-year probationary lease on the planet for the purpose, according to your Sole Use Application, of—" I conjured up the precise words the ship had used during our approach to Valhalla "—'of investigating the mysteries of the Artifact, of bringing the indigenous life-forms into the community of beings, of protecting the world's unique environment from the depredations of man, and of conducting other activities consistent with the Covenant of the Octavian Society.'"

"How come you're no longer a Senior Facilitator?" demanded the man who looked like an undertaker. "There're only a couple hundred facilitators in Human Occupied Space, all of them making fortunes. I never heard of one giving it up."

"It's a long story, Mr . . . ?"

"Motry, Damon Motry."

I nodded a polite acknowledgment. "To summarize, Mr. Motry, my license was unfairly suspended for reasons too complicated to go into. Someday I intend to clear my record and reinstate my good name. But first," I gestured at my disabled ship, "I have to repair the *Venture*."

"There's nothing stopping you," snapped Fortinay. "Go back to your ship, make your repairs, and *go*!"

"I will, as quickly as possible."

"How long will that take? We can't have our work interfered with."

"Under the terms of the St. Simeon Accord," elaborated Damon Motry, "we only have another two years to complete our initial studies if we're to retain our Occupancy License. Then—"

"Do be quiet," Fortinay ordered. "Our business is no concern of his."

I spoke with the voice of pure reason. "During my descent, I detected one of your ships in the upper atmosphere. To speed things along, perhaps its engineer could give me a hand."

"We have no orbit-capable ships."

"But my screen—"

"Don't tell us our business. We have twenty-seven aircars, and none of them were aloft when you landed."

"I must have been mistaken," I replied diplomatically. "But you still have to maintain your equipment. Perhaps your maintenance chief knows something about starship systems?"

For the first time a look of uncertainty crossed Fortinay's grim face. "Well," she said at last, "I suppose you could talk to Lester—he's our chief engineer and mechanic. He might know how to fix whatever's wrong."

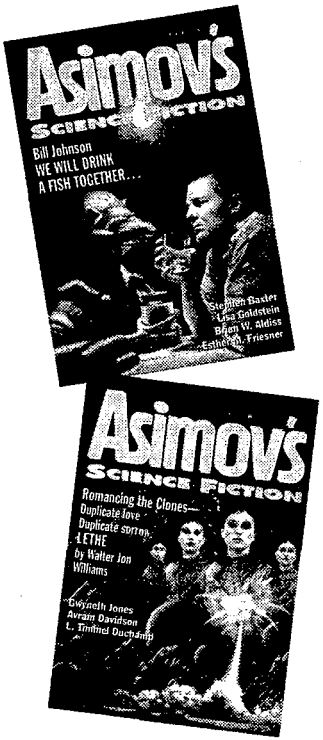
"I sincerely hope so." I pointed in the direction of the settlement. "He's somewhere over there? May I—"

"Absolutely not! You'll interrupt our work as little as possible. We'll send Lester to your ship. In the meantime, stay away from the Flotati—they're extremely delicate creatures."

Lester Crisp stomped aboard the *Venture* with the swagger of a sumo wrestler though with only a tiny fraction of the matching physique. Four and a half feet tall and perhaps one hundred pounds in weight, he was obviously an Elphinstone Elf. Native to a harsh planet on the far side of HOS, Elves were notoriously crotchety specimens who were

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

DISCOUNT TIME TRAVEL



Save 40% on Your Next Trip!

You'll join the vanguard of science fiction when you order our **Asimov's Science Fiction Value Pack**. You get five of our most popular back issues for just $8.95 plus shipping. **That's a savings of 40% off the regular price!**

Asimov's always delivers the most celebrated authors in the field. Share their visions now with dozens of stories that launch you into the fantastic worlds of tomorrow.

To get your **Asimov's Science Fiction Value Pack,** just complete the order form below and mail it back to us with your payment today.

PENNY MARKETING

Dept. SM-100, 6 Prowitt Street, Norwalk, CT 06855-1220

☑ **YES!** Please send me my **Asimov's Science Fiction Value Pack**. I get 5 back issues for just $8.95 plus $3 shipping and handling ($11.95 per pack, U.S. funds). **My satisfaction is fully guaranteed!** My payment of $_____ is enclosed. (IAPK05)

Name: _____
(Please print)

Address: _____

City: _____

State: _____ **ZIP:** _____

Please make checks payable to Penny Marketing. Allow 8 weeks for delivery. Magazines are back issues shipped together in one package. To keep prices low we cannot make custom orders. Add $4 additional postage for delivery outside the U.S.A. Offer expires 6/30/99. 068C-NN5VLL

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

as celebrated for their petite size and hereditary surliness as for their engineering skills. It was reassuring to see that the cultists trusted their systems to an Elf rather than one of their own.

He nodded unenthusiastically, his pendulous lips, beaklike nose, and long pointed ears about as far from the human norm as any group had evolved since Man had begun to spread across the galaxy. Unlike the Octavians, he displayed no eight-legged swastika on his chest, nor had his clothes come from a rag sale. The Elf sported a perky green cap, red boots, and a superbly tailored pale blue uniform encrusted with white and gold tassels and on which bows and braids were draped in wild profusion.

Lester Crisp darted a quick glance around the *Venture*'s control room and the salon, his bright, quicksilver eyes missing nothing. "The Spiders ordered me to help you out." He scowled at me with shaggy eyebrows any sheepdog would have been pleased to own.

"Spiders?"

"Eight-legged creatures, most spiders are." He jerked his thumb in the general direction of the Octavians' settlement.

"Ah. I hadn't considered the Octavians from that perspective."

"Lots o' things people don't consider," he retorted testily. "Now then, what's wrong with yer ship? It's the Spiders who're payin' me, not you, not that they're payin' very much."

I tried to explain, and after numerous gruff interruptions and the not very subtle implication that I was a mechanical idiot, grumbling and muttering, the Elf set to work.

"What's this contraption?" he asked suspiciously, pointing to the crystal-based translating device in the control cabin that the Bagpipes had built for me several months before on New Sonora.

"It's experimental—a specialized communicator for use with alien species. It utilizes a unique technology which attempts to facilitate interaction via an exchange of images on a gestalt level." The Elf stared at me moodily. "I find it very useful in dealing with new species," I added lamely.

"Does it have anything to do with your engine problems?" he demanded impatiently.

"Not at all."

"Then if you're done wastin' my time babblin' about it, I'll get back to work."

He stomped from the control room. For the next half hour I watched admiringly as he probed deeply into the *Venture*'s drive system without ever catching a dangling epaulette or whirling tassel or getting the tiniest trace of dust or grease on his immaculate white gloves.

Finally he allowed me to lead him back to the salon and offer a glass of Sandusker wine. "Can you fix it?" I asked anxiously.

He considered the contents of his glass dourly. "Of course, I'm not a fool, am I? Just replace the main plasma synchronizer multi-circuit block and everything else is easy. I've got a spare one in Stores that would fit well enough and have you on your way before you know it. We use them in the generating plant."

My heart began to beat again in a way it hadn't since my ship had first given me the grim news twenty-seven hours earlier. "Mister Crisp, those are the most pleasing words I've ever heard."

"Before you get too excited," he snapped, "I didn't say I would fix it, just that I could. I'd have thought a Senior Facilitator, even a disbarred one, would've noticed the difference."

"What?"

The Elf sighed plaintively. "Just because the plasma synchronizer is in Stores," he explained as if to a child, "doesn't mean that the eight-leggers are gonna let you have it. Generous they're not. Who would know that better than me?"

"Give you our last plasma synchronizer? Inconceivable!"

Both by temperament and by training,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Senior Facilitators are far above the norm in sympathy, empathy, understanding, and overall tolerance for the foibles of their fellow man. Thirty seconds in the presence of the head Octavian, however, had been enough to tell me that Roderick Horvath was going to be high on my list of people whose necks it would be a pleasure to wrap my fingers around and squeeze tightly. In spite of the Octavians' claims that they were in a hurry to get rid of me, he had made me wait most of the day before finally receiving me. In the room with us now were a sardonic Lester Crisp and a glowering Glaxia Fortinay.

The Mandator General was the first person I had ever met whose ambitions encompassed making himself look as much as possible like an octopus. A benevolent Nature had given him a head start. Both his face and body were long, thin, and curiously shapeless, as if he didn't possess the normal complement of bones. His arms were as long as I had ever seen on a human being, and at some point talented surgeons had attached two extra fingers and a thumb to each hand so that he now could wave eight digits at the end of each arm.

Besides his shapeless beige shirt bearing the usual Octavian emblem of an eight-legged swastika, Horvath wore a body-length cloak draped across his shoulders. It took a moment to realize that it was composed of eight imitation cephalopod tentacles. Each tentacle apparently had a lightweight servomechanism hidden within, for as Horvath talked the arms wriggled in an unnervingly realistic fashion.

"I'm not asking for a gift," I replied mildly. "I'll certainly pay a reasonable price for the synchronizer. Otherwise I'll be here forever."

"Lester?"

"The next supply ship will arrive in sixty-three local days," said the Elf. "According to the manifest there'll be two more control blocks on board. We'd probably be all right without a—"

"Two months without a spare plasma synchronizer control system for the generating plant?" Horvath's voice was so distorted that it was barely understandable. "If the plant should break down and we've given this uninvited intruder our last unit then we'd be without power for two full months."

"But we have to get rid of him," trumpeted Glaxia Fortinay. "And the sooner the better. Therefore—"

"Please, Glaxia," murmured Horvath. "The decision rests with me to—"

"You've become little better than a dictator since we got here! As Mandator Adjunct I—"

"I asked you to be silent, Glaxia. I will decide how to handle this!"

"Oh, yes?" The Valkyrie stalked angrily towards the door. "Then you leave me no recourse but to review the pertinent passages in the Third Book of Halish. You may finally have pushed us all too far . . . ."

Lester skipped deftly out of Fortinay's way, sketching a marvelously sardonic bow as she swept imperiously by and out into the fading twilight.

Horvath turned his attention back to me. "Kindly keep out of our way until the supply ship arrives. At that time, we will determine what an appropriate price will be." He considered me mournfully with liquid brown eyes. "We will, of course, be billing you for landing fees, storage facilities, maintenance charges, natural resource depletion, pollution control, and environmental degradation. These fees you may pay on a weekly basis."

I paused long enough to scour any trace of my almost overriding fury from my voice. "All of those issues I'm certain we'll resolve at an appropriate time," I said noncommittally. "Good day, Dr. Horvath." I stalked from the dome into Valhalla's damp, air.

"That Sandusker wine wasn't so bad," came a surprisingly soft voice behind me, "but it can't compare with Elphinstone Amber. If you'd care to share a glass . . . ."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I nodded gratefully. "It's been a long day since the shovel brigade woke me up, Mr. Crisp. A glass of Elphinstone's finest is precisely what I need."

"So I thought."

A vivid flash of sheet lightning turned the sky behind the northern peaks a deathly white and everything else into a hellish rockscape of ebony shadows. A few moments later an enormous clap of thunder rolled over us like an invisible wave. I sighed. If Odin and Thor were trying to tell me something, so far their message escaped me.

We sat in a small, sheltered patio outside the Elf's tiny quarters and watched the sky fade from indistinct white through pearl to a pale charcoal veined with flickering blue-white wires of electricity. The Elphinstone wine was thick, sweet, and rather lemony.

"An impressive view," I said. "It must be pleasant sitting here at sunset and watching the world go dark."

"For a fact, Cap'n Howe. One of the few benefits of workin' for the Spiders."

"A peculiar bunch. My database has relatively little information on them. Can you fill me in?"

"Not much to say. They're definitely a dispiriting people, all taken with all, from Sternin IV in the Canis sector, which they call Octavia. A wet world, over eighty percent ocean, two big continents like a belt wrapped around the poles. The principal indigenes evolved from the ocean, big carnivorous things with eight flexible legs."

"Like an octopus?"

"Octopus?"

"Earth creature, soft, gelatinous, with eight sucker-studded tentacles. Often very large but quite harmless and very shy."

"Never heard of them, but the things on Octavia are neither harmless nor shy. When the humans got there they found everything had eight legs and that some were pretty nasty creatures. Not stupid either. It's worth your life to try to sail Octavia's oceans—air travel only. The dominant creature on land was the Great Eight, as the colonists named it. Fast, vicious, deadly, and smart. The colonists had a rough time of it for the first generation or so, till they got the hang of killin' 'em."

"Yes, humans are good at killing things," I sighed.

"That we are, Cap'n Howe, especially when there's money to be made. It turned out that the Great Eights were valuable—dead, that is. The pharmaceuticals distilled from their blood are useful in antisenescence treatments."

"So they were hunted almost to extinction," I said after a moment's automatic extrapolation, "but now they're raised commercially to fund the planet's economy."

"Yep. It got so bad that some of the Octavians felt pretty guilty about killin' the Great Eights the way they did. Claimed the beasts were really a higher order of life, better than humans, even. So some of 'em started worshiping them and founded the Octavian Society. Anything with eight arms bears the mark of God and will lead 'em to salvation. Mention a new creature that has eight or more arms and they'll come a'runnin' like flies to a dead dog. That's why they're here."

"The Gasbags have eight tentacles?"

"Yes. And then there's the Artifact."

"According to my database, the Artifact is merely a collection of tubes and pipes that make peculiar sounds when the wind blows through them."

"Some database! Didn't it mention the Apparition?"

"There was a footnote that referred to supposed visions that had appeared in the vicinity of the Artifact, but the librarian discounted them as probable atmospheric phenomena viewed by solitary scouts who had relaxed with a few too many drinks. You don't agree?"

"Who's to say?" Lester said, cocking his head. "I can tell you that when a dozen sober Spiders report seeing the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

same thing at a dozen different times I'm not gonna close my eyes and pretend there's nothing there."

"What do they supposedly see?"

"Strange thing, creature of some kind, thirty feet tall, floating in the air above the artifact, brown-gray skin, all tentacles, no head or hands or anything else, just tentacles waving in time to strange moans and bellows from the Artifact."

"Brown tentacles?" I repeated, the hairs on the back of my neck starting to tingle. "Might it be tubes or hoses of different sizes and lengths bundled together in the main part of the body and protruding from the top and bottom like the branches and roots of a tree?"

Lester snapped his head to an even sharper angle and eyed me warily. "Now why would you say something like that, I wonder?"

Should I tell him about the recently discovered aliens called the Bagpipes and their obsessive interest in a certain variety of crystal that had almost gotten me killed on New Sonora? Until I knew more, it might be best not to say too much.

"I've heard about such creatures somewhere," I said off-handedly. "As you know, facilitators are always interested in any information they come across. We never know when some snippet will come in handy."

"But you're not a facilitator any more, are you?"

"No. But I plan to reactivate my license as soon as possible."

"But now you're only a one-man freighter operation."

"Yes, and it's imperative that I get off this planet immediately and back to work."

Lester refilled my glass. "You saved nothing of your wealth, then?"

"I had substantial reserves until New Gibraltar went out of congruence and all of my investments disappeared with it."

"So all you've got is your ship?"

"The bankers on New Zurich have my ship. They just let me use it between loan payments. And the next one's coming up soon."

"Surely you can be a little late now and again."

"Only if I'm willing to be a little dead." The Elf shot me a quizzical glance. "When you borrow money in New Zurich they take your pancreas and install an artificial unit in its place. Each year they have to transmit an encrypted activation code or it shuts down and you die. Naturally, they only transmit the code after you've made your payment."

"I don't see the problem," Lester said, his habitual scowl growing even darker as he briefly consulted the micro-encyclopedia he dug from a jacket pocket. "Says here you could have another pancreas cloned and inserted, or maybe just take insulin supplements."

I shook my head sadly at the Elf's naïveté. "The pancreas I've got now is a cloned organ, but with vital modifications. It tags the insulin it produces with a molecular marker. If it detects any insulin in my blood stream without that marker it filters it out. Any attempt to remove my current pancreas without the 'paid in full' code would result in the release of a neurotoxin that would kill me in seconds. The New Zurich pancreas regularly secretes a complex protein that neutralizes the toxin. Remove it and the toxin will kill me."

"Hrmph," the Elf grumbled. "I see why you're in a hurry to leave."

"Every day I spend here is a day I'm not earning the money I need to make my payment. Isn't there some way you can convince the Octavians to let me have that part?"

"I'd as soon be able to fly by flappin' my arms and whistlin' bird calls."

I nodded dolefully, then turned back to the horizon. It was now a deep charcoal relieved by only the slightest crescent of fading pearl at the western edge. Without further discussion we swallowed the last of the Elphinstone wine as the sky faded to unrelieved black, tex-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tured in the far distance with three quick flickers of blue-white bolts.

I could think of nothing to be accomplished by staying aboard the *Venture*, so late the next morning I stepped into Valhalla's almost perpetual drizzle. I wandered aimlessly around the cultists' small settlement until I saw the top of Lester Crisp's perky green cap bobbing up and down in the front seat of a yellow aircar parked on a hillock just behind the largest of the domes.

"Is that you, Mr. Crisp?"

The Elf's face appeared in the transparent canopy just as lightning turned the world around us an eerie white. A moment later a squall of icy rain swept over the domes. Lester threw open the door and above the hiss of the rain I heard the Elf's querulous voice: "—want to stand out there like a Diver's Duck in a beer barrel, go right ahead! No, no, in the back seat! Can't you see I'm workin' up here?"

"On what, Mr. Crisp?" I murmured as I slumped into the rear seat.

"Changing this damned upholstery, can't you see? Those mechanical arms the chief lunatic likes to wave around might be good for something, don't ask me what, but they're hell on an aircar's seats. So every couple months I gotta—"

Doors on both sides of the aircar flew open and two drenched figures threw themselves inside. Roderick Horvath's artificial tentacles flailed wildly as he pushed Lester behind the controls and wriggled himself into the adjoining passenger seat. "Take us up immediately!" he snapped. "Raji Kav's been killed!"

"Like the others?" the Elf asked calmly as he pushed pieces of torn upholstery out of the way and readjusted the seat. "That is to say: fried?"

"What a horrible remark!" bleated the dripping figure in the seat beside me. "You are the most disrespectful—" Glaxia Fortinay's attention suddenly turned to me. "What are *you* doing here?" Shovel-like hands thrust me towards the aircar's door.

"Too late for that," Lester warned above the sudden roar of the aircar's engine as the craft soared aloft. Was there a hint of sly pleasure in his voice? "And now, Dr. Horvath, if you would kindly enlighten me as to what direction I should direct this vehicle, I'll see if I can find your fried colleague's body."

After several minutes of steady climbing the aircar broke into bright sunlight. Beneath us stretched an expanse of rolling gray dumplings pierced at the horizon by the tips of a range of mountains. The clouds in the middle distance were dusted by a scattering of rusty dots.

"Are those the celebrated Gasbags?" I asked, gesturing toward the steadily approaching dots.

Glaxia Fortinay sniffed massively. "Only vulgarians call them Gasbags. Their proper name is Animus Flotatus."

"Well then, are those the Animi Flotati?"

But having put me in my place, Fortinay lapsed into silence. It was the Elphinstone Elf who answered my question. "That they are, Cap'n Howe. In just a moment we'll have a pretty good view of them." He sniffed loudly in passable imitation of Glaxia Fortinay. "Just make sure you've got your lightnin' rod handy."

The pod of a dozen Gasbags rapidly grew to the size of large hot-air balloons. For a moment they were visible several hundred yards to port. Before they dwindled behind us I distinctly saw electrical flickers passing between them. "Did a lightning bolt just shoot out of one of those things, or did it get hit by one?"

"Out of," said Lester curtly, then subsided into moody silence as he studied the aircar's instruments. A few moments later we abruptly plunged back into the clouds. "Almost there," the Elf announced, "and look at that: we've actually got a little sunlight poking through!" Then he added cryptically: "Just what they need to make targetin' easier."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

* * *

The aircar settled at the edge of an overgrown meadow sprawled hard beside the base of a low ridge. To the left the meadow opened into a plain that swept away to a range of eroded mountains four or five miles in the distance. Overhead, broken clouds scudded beneath the now open sky. As we strode across the field I saw three Octavians standing at the base of one of the many orange-brown rock cairns that studded the meadow like petrified anthills. With pained expressions they were staring at a shape sprawled at their feet.

I stopped between Horvath and the pear-shaped Octavian named Damon Motry. Raji Kav lay on his back, a red-black line of charred flesh running from his skull just above his left ear all the way down his left side to the burned-away tip of his left boot. Stubs of two charcoal toes pointed to the sky. Kav's shirt and pants were a synthetic blend that had melted in an unbroken stripe outlining the bolt's path down Kav's body to the earth. The corpse's face was contorted in mid-scream and his left eye socket was only a black hole, the fluid in the eyeball having vaporized, expelling the organ from Kav's skull within a fraction of a second of the bolt's impact.

"Just like the rest," Fortinay murmured. The others nodded in agreement. "I told you this would happen," she went on angrily. "They don't want us here, isn't that clear?" The blonde waved her hand vaguely at the northern sky where I could just make out a handful of faded dots: Gasbags lazing in the humid air. "Look! There they are!"

"You think the Gasbags did this?" I asked Horvath. He merely glowered at me and swung away, his octopus-tentacle cape swirling dramatically as he raised a pair of binoculars in the direction of the pod of 'bags.

"Isn't it obvious?" demanded Motry.

"Not entirely."

"If you're that stupid, no wonder they disbarred you," Roderick Horvath muttered without taking the glasses from his face. "I don't agree with some of my colleagues about why the creatures are doing this, but certainly there's no question but that they are."

"Really? If you knew more about electricity and its interaction with human flesh," I said politely, "you'd realize that the duration of the bolt that struck this man was at least an order of magnitude longer than it should have been and its wattage far less."

"So?"

"The injury to this body is inconsistent with a lightning strike."

"My point exactly," Horvath snorted, finally lowering his binoculars. "Since he wasn't killed by normal lightning, it was obviously done by a Flotatus."

"I think that's highly unlikely. No organic creature in known space can generate more than a few amps of current. Ten amps is believable. A hundred amps? Barely possible. A thousand amps? Ridiculous! Ten thousand? It doesn't even bear consideration. Nothing organic could ever generate such a current flow for such a relatively long period of time."

The eight artificial tentacles that drooped from the Mandator General's shoulders writhed in agitation as he waggled his hand at me. "Have you ever examined a Flotatus, Howe?"

"No, but—"

"Exactly. You don't have the faintest idea how they're constructed. For all you know, they're filled with silicon plates that charge up like a big capacitor, sucking current from Valhalla's storms. Maybe they don't generate the bolts at all. Maybe they merely redirect them, acting as a lightning rod for charges in the clouds and then releasing them wherever they want. That's not impossible, is it?"

"No," I agreed reluctantly.

"So much for your theories then. Fortinay, Motry, get his feet and you two grab his hands. That pod is heading this way and I intend to be gone long before

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

they get here and do to us what they did to Kav, no matter what the reason for their displeasure."

As we slowly rose towards the eastern ridge with Raji Kav's body in the tiny cargo hold, I watched the pod of eight or nine 'bags drift ponderously into position two or three hundred yards above the spot where the Octavian had been killed. They seemed restless, jostling back and forth as if confused by the absence of his corpse.

"They're angry we've taken the body!" Fortinay declaimed. "Lester, get out of here before they attack the car!" The Elf flicked a steely glance at the Valkyrie and continued on his course.

As we passed the nearest of the 'bags I got my first good look at the creatures. This one was a deep blood-red at the top of its flattened sausage-shaped bag, shading to a faded carmine at the bottom. From its base eight fifteen- or twenty-foot long trunks or tentacles hung limply. The other Gasbags in the pod had similar shapes, but I wondered how adjustable they might be in the event of a change in wind or weather. I pressed my face against the canopy to make out more details but by then the creatures had become little more than burgundy dots against the green prairie.

When we had landed and Raji Kav's body had been carried away I followed the Elf. "A question, Mr. Crisp?"

"I suppose," he grunted without enthusiasm.

"Do *you* think Kav was killed by one of the Gasbags?"

"Couldn't say one way or the other," he replied, his lips snapping shut with finality.

"How many other deaths have there been?"

"If memory serves, Dr. Kav was the fourteenth Spider to get himself fried since I've been here. That's about a year now."

"Fourteen? Out of how many?"

"How many Spiders? Oh, including support staff, there's about three hundred, sometimes a little more, sometimes a little less, depending on leave schedules."

I did a quick calculation. "It's not possible for these to be merely random strikes, even on a planet with as much electrical activity as there is here—the numbers are off by at least an order of magnitude. Do the Gasbags seem hostile from what you've seen of them?"

"They've never hurt me, or seemed to want to, but why should they? I'm just a hired grease monkey."

"I'd like a better look at them. Could you lend me an aircar tomorrow?"

"Be worth my job. Still, aircars always need testing after an overhaul, don't they? I've been planning on making a test run out to the Artifact. You could come along if you liked."

"Is that where the Gasbags live?"

"Live? Hell, who knows? There's always a bunch of them out that way, that's true enough—that's where that pod came from today. The Artifact is near the mountains north of where Kav was killed. That's why Dr. Horvath was strainin' his eyeballs staring at the hills. He knew that's where the 'bags would come from if they were gonna get interested in us. I'll say this for the 'bags—they're a curious lot. Can't stand around twenty minutes anywhere near them before they wander over to see what you're doin', real friendly-like except for all the Spiders gettin' themselves toasted."

"So you're not afraid of them?"

"Me?" Lester cackled sardonically. "I'm no Spider pokin' around their damn Artifact." The Elphinstone Elf gave me a jaunty wave and marched away, his back ramrod straight. Above us a steel gray thunderhead boiled up out of nowhere and I ran for the *Venture* to escape a drenching.

The next morning when we took off to visit the Artifact the sky had a peculiar mottled texture that I'd never seen before—blotched purple-black in some

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

places and faded robin's-egg blue in others.

"Are we heading into bad weather?" I asked Lester and nodded at the pock-marked sky above us.

"Bad weather? What else is there?" The Elf gave me his usual dyspeptic twist of the lips and adjusted the aircar's course a fraction of a degree toward the northwest. "I'm more concerned about the guidance system I just installed in this rattletrap flyer."

Ahead of us a line of low, worn mountains gained definition, revealing a network of ridges and swells that spread into the edge of the dark olive prairie. "There's the Artifact the Spiders are so excited about," Lester said, pointing at what looked like a scattering of rocks at eleven o'clock a couple of miles ahead of us.

As we neared the Artifact, what from a distance had seemed a field of rocky debris now resolved into a litter of constructed forms as if a giant fist had shattered a Greek temple and left its columns and lintels in the dirt for a few thousand years.

"That's where Georgi Zacayev got fried, over there halfway between us and that sort of bent-melted thing," the Elf deadpanned as he brought the aircar in for a smooth landing. "I was unlucky enough to see it. He just stood there, pantin' like a dyin' dog, when the bolt got him. Turned him black, it did."

"Were there any Gasbags about?"

"Not that I could see. It was even cloudier than today. The bolt shot out of the sky and that was the end of him." Lester popped his door and jumped down to the soft black earth. A moment later he was leading me into the heart of the Artifact.

Around us were hollow rocky tubes like hand-chiseled sewer pipes, off-center ovoid blobs pierced by hundreds of holes in no particular pattern, concave stone disks eight feet in diameter whose interior surfaces were perfectly polished but that were so asymmetrically carved that their foci lay in strange and improbable locations. Underlying all was a peculiar, low moaning sound that wavered in pitch and volume in response to each change in the wind off the mountains.

In several places short columns pointed skyward at slight but varied angles, their sides pierced by dozens of fist-sized holes. I paused next to one of them and, ignoring Lester's disapproving stare, climbed its six-foot height using the holes as a makeshift ladder. To my surprise the cylinder was neither hollow nor solid rock.

The outer rim was the same local stone that seemed to have been used for the rest of the Artifact—a flat, unveined, tan-gray rock—but beginning about six inches in from the outer edge the column was filled with a translucent material. I put my face against the slick surface and thought to detect faint glimmers of light within, but I could be sure of nothing. After rapping it with my knuckles and rubbing my fingertips across its cool and subtly textured surface I shook my head and made my way back to the ground.

For the next half hour we wandered through the Artifact. Each minute the moaning grew louder and more dissonant, while above us the clouds fractured like rotten ice melting on a spring day. Suddenly a misty white patch of sky thinned and turned a deep blue as a sudden porthole opened in the overcast. Instantly a brilliant blue-white beam thirty yards in diameter struck the southwestern edge of the Artifact. I felt a tingle crawl up my spine, a sense of imminence presaging the close presence of some peculiar event. Above me more holes appeared in the clouds and a tangle of beams speared down. The air itself was affected by the sun's sudden appearance, and gusts of wind coursed back and forth in sharp tides and flurries from every point of the compass.

In response to the bizarre weather, the notes generated by the Artifact changed, shifting from the atonal moans

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

to which we had been listening to a chorus of honks, squeaks, and hoots. With no great surprise, I recognized the cacophony as the language of the Bagpipes.

"They're comin' all right," Lester muttered more to himself than to me. I turned to follow his gaze. Oblivious to the shifting winds, I saw a cluster of rusty dots slowly making its way toward the Artifact from the canyons at the base of the mountains. As the Gasbags approached and passed through the beams of light their dull rust color was transformed into a deep, iridescent ruby. At the edge of the Artifact the 'bags halted and began to station themselves in a circle around its periphery.

The holes in the clouds closed and opened with peculiar rapidity, sending beams darting into the Artifact as if tasked to light it as a scene in some outlandish theatrical production.

"Seems we're about to encounter a shared optical delusion," Lester said dryly, pointing to the sky above the center of the Artifact. I turned and followed his finger. There, above one of the canted cylinders, an image began to form. I knew, of course, what it was: a thirty-foot hologram of a Bagpipe, waving his hoses and snapping his body in synchronization to the hoots and tones from the Artifact. I devoutly wished that Rebona Myking and her notebook computer with its neural-net visual system were here instead of Lester. A few minutes' work with her database would give me at least a rough understanding of the message the holographic Bagpipe was trying to convey.

Familiarity with the Bagpipes made the hologram far less fascinating to me than it was to Lester. But if the Elf was merely curious, the Gasbags were enthralled—almost, I sensed, reverent. Obviously the Bagpipes had once been on Valhalla, and before leaving they had constructed the Artifact to give a giant-sized, one might say a Gasbag-sized, Show-and-Tell performance every time the sun broke through the clouds at certain angles and with sufficient energy to power the holographic projectors buried within the Artifact's components.

What was the simulacrum saying? I wondered. "We'll be back in a few thousand years; don't break anything, and please don't make a mess?"

Could the Bagpipes have been here looking for deposits of the semi-living crystals on which they depended to cross the distances between the stars? If so, the hologram might be warning: "Those are our crystals over there. You Gasbags make sure that nobody disturbs them!" If the Octavians had begun mining a crystal deposit, then maybe the Gasbags really were frying them after all. I knew from personal experience that the Bagpipes had little patience with anyone who disturbed the crystals' habitat.

Which made me take a second look at the mouth of the canyon that began a few hundred yards to the north of the Artifact.

"I need to take a look over there," I said, pointing to the narrow gorge just beyond the line of floating 'bags.

"I ain't stoppin' you," said Lester.

"You won't leave without me?"

"Leave you? Hellfire, I wouldn't even strand a Spider out here."

"All right, then. I won't be long." I took a last look at Lester's sour, disapproving face, then broke into a trot and headed for the canyon. At each step I half-expected a lightning bolt to sizzle the ground at my feet but I passed below the 'bags without incident.

Jogging into the gorge, I rounded a narrow bend and quickly found what I had been looking for. Almost obscured by a riot of spindly limbed silver-green plants was a black, half-moon aperture in the far wall.

I slipped my pen light from my pocket and stepped into the cave. As I worked my way deeper into the tunnel, I recalled the lightless passages of the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Bagpipes' giant cactus on New Sonora. Here was a species with no interest whatever in bright lights or airy spaces.

The texture of the wall changed from earth to aggregate to deep umber stone, to ebony rock shot with veins of milky quartz that gradually grew in width and translucency. Two hundred yards in, I caught a particularly bright glimmer at the base of the wall. I grabbed a disk-shaped rock that I used to chip away at the facing until the shard of crystal illuminated by my light broke free. Whether or not it was the same material that the Bagpipes used in their starships I couldn't tell, but the tunnel was definite confirmation of the Bagpipes' initial interest in Valhalla. But since they hadn't returned, my guess was that they had hoped to find other deposits of crystal and had failed to do so. Perhaps this planet was now on a low-priority list, awaiting further exploration in a few hundred years if their deposits on other planets were threatened. I shoved the crystal in my pocket and moments later was hurrying out the way I had come.

When I reached the entrance the air was filled with rain, and lightning cobwebbed the crack of sky above the gorge. I raced back down the canyon. As I neared the Artifact I saw that the hologram had vanished and that all of the Gasbags had departed except for one huge specimen. I found Lester ineffectually trying to shelter himself in the lee of an oblong stone column.

"Thanks for waiting," I shouted over the drone of the storm.

"A man's only as good as his word," grumbled the Elf. Both of us were already soaked to the skin so we trudged stolidly back to the aircar. As we took off I watched the huge 'bag floating above the Artifact. It looked as if his nest of tentacles was flickering in a complex set of motions not dissimilar to the sign language of the long-departed Bagpipes. A searing bolt of lightning flashed across the sky just in front of the aircar, and when my vision returned, the solitary 'bag had vanished into the gloom of the storm.

A quick search of the aircar's storage compartments turned up a couple of ragged blankets that we used to dry ourselves as best we could. Then, wearily, I settled back into my seat and luxuriated in the warm air pouring from the heater vents. I closed my eyes, comforted by the rattle of the rain against the aircar's shell and the clicks and hums from Lester's manipulation of the controls. A few minutes later, though, the Elf startled me with a colorful string of Elphinstonian curses.

"What's wrong?"

"Accordin' to the inertial display, we're headed directly back to camp. But accordin' to the backup system we're thirty degrees off course. And, accordin' to the old-fashioned, highly unsophisticated, and purely mechanical compass, we're seventy degrees off course."

"Which one is right?"

"Aye, that's the question, isn't it? The main system is the most accurate, but that's the one I put in yesterday that we're supposed to be testin'. It worked perfectly on the trip to the Artifact. Now I don't know if it's workin' or not."

"And the backup—"

"—system is as old as the car and never worked properly anyhow."

"And the compass is highly unreliable given Valhalla's less than stable magnetic field. So, what do we do?"

"This storm could last all day, and if the compass is correct we're headin' straight for the Pinnacles. But if the main system is correct, we'll be back at camp in forty minutes."

"Easy," I said, having weighed the alternatives. "We fly as high as we can for forty minutes, then slowly descend and see if we're over the camp. If we're not, we at least ought to be past the Pinnacles. But then what?"

"Very good, Mr. Ex-Facilitator. Then we wait for the storm to break. I hope you had a hearty breakfast."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Forty minutes later Lester slowly took us down through the swirling clouds. "And they claim this car's radar is 'all-weather.' Hah!" the Elf barked as we descended foot by cautious foot.

An eternity later we settled onto what felt like damp earth. Through the canopy all I could see was a rolling, gray-green blur of grass and shrubs blending at twenty or thirty feet into the gloom of the storm. For an interminable period we watched the clouds thin to a layer of charcoal overcast two or three hundred feet above the gourd-shaped valley in which the aircar rested.

"Are those boulders?" I muttered finally as I squinted at the landscape of squashed mounds scattered across the valley floor. In the dim light the bumps looked like half-melted bonbons in shades of gray, purple, and black.

"Ain't seen no rocks like them on this mudball," Lester grumbled.

"How long do you think before we can head back?"

"Not enough daylight left to get back today," he growled, now thrust far back in his seat with his arms folded angrily across his chest. "We'll have to wait till tomorrow."

For another thirty seconds I stared at the dimly lit valley and its vague melted humps. "I'm not going to just sit here peering into the mist," I announced, then turned and pulled out a plastic tarp I had found in the rear storage compartment. "I'm going to look at those mounds. There's another plastic sheet if you want to come." The Elf looked at me as if I were mad and twisted his face into a sour scowl. "Fine, join me if you change your mind. I'll be back in a few minutes."

Wrapping my shoulders with the tarp, I jumped down from the aircar and trudged through the high, wet grass. I smelled damp soil, decaying leaves, the vague minty fragrance of Valhallan grass, and a rich, sweet-sour odor that I couldn't identify but that grew stronger the closer I got to the humps. A hundred yards from the first mound I recognized the odor and simultaneously identified the amorphous shapes.

The first one was purple-black and about thirty feet high at its tallest point, a rim surrounding its collapsed, dimpled top. I couldn't guess how long ago this Gasbag had died—a month? a year?—but long enough so that it now emitted only a stale, sour smell rather than the cloying reek of recently dead flesh. I could see that at the last instant it had tilted onto its side, the broken, brittle tentacles extending northward from the base of the collapsed globe. Slowly, I walked over to the point where they joined the bag.

A group of four thick tentacles were affixed in a semicircular pattern at what I guessed was the forward part of the bag. Four more arms, perhaps only half as thick, extended from the rear of the anchor point. A forest of smaller members two or three feet long surrounded a saw-toothed beak at the center of the assemblage. Judging from the size of the opening, the largest animal the Gasbag could have eaten would have been about the size of a large cat—if, of course, the Gasbags were carnivorous in the first place. On the face of it, this was not an animal that would see humans as its natural prey.

I slid my hand along its flank. The surface felt thin and crisp and slightly flexible, like onionskin paper or a stiff plastic film. I prodded it, then flexed it in and out. It made a crinkling sound as it moved free of the thicker layer beneath. Were these creatures the source of the bolts that had killed the Octavians? Almost impossible, but still . . . .

I stepped back a pace, stared up at the Gasbag's collapsed bulk, and exhaled a sigh that was instantly lost in the damp breeze. There was no help for it. I was going to have to take a look inside if for no other reason than to counter Horvath's suggestion that the creatures were filled with plates forming a huge organic capacitor. I pulled a folding knife from

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

my pocket, offered the dead 'bag a silent apology, and cut a diagonal slit from above my head down to the ground. The knife slipped easily through the desiccated skin and underlying flesh. A second incision, and a triangular flap two feet wide at the base sagged away from the carcass.

A puff of fetid air pulsed out and I waited up wind for the sour odor to dissipate. Finally, wrapping a bandana over my nose and mouth, I snapped on my penlight and stepped inside. I had anticipated that the bag would be only empty space, its shape maintained in death by the resilient nature of its skin, but I was wrong. Instead of mimicking the interior of a stiff-walled hot-air balloon, the inside of the Gasbag more closely resembled the inside of a dirigible—the open space crisscrossed by cables and tendons. After a moment's thought it made sense.

Under proper control the bag could be deformed, warped like a sail or a vertical wing, its trim, shape, and angle adjusted to ride with or across the wind. If the surface of the bag contained cells that could sense pressure, wind, moisture, and sunlight, a good enough organic brain could use the winds to traverse Valhalla at will. Unless there were some species of bird that attacked the Gasbags, and there was no record of any in my database, the 'bags would have no natural enemies. With their low energy needs and most of their mobility supplied by the wind, vegetable protein would be sufficient for their diet.

These were creatures with no evolutionary need to develop aggressive instincts or natural weapons, vegetarians with no more inherent reason to kill humans than Terran cows had. And hadn't Lester said that they did hang around mountains to forage for some favorite shrub? Surely they didn't need electrical charges to overcome a plant.

Logic said that the 'bags would be placid, easy going, with good brains and enough spare time to evolve a sense of curiosity. I simply couldn't see them as man-killers. But any species could have dangerous individuals, psychopaths. Perhaps a single rogue Gasbag was responsible for all the deaths, a theory that would explain the apparently random nature of the attacks. Assuming, of course, that the creatures had the physical ability to inflict the damage I had observed.

In as nightmarish an experience as I had ever undertaken, I worked my way through the Gasbag's mummifying corpse. Apparently some chemical in the 'bag's system inhibited insects and putrefying bacteria, thus allowing the carcass to slowly dry and toughen until it reached a texture not dissimilar to soft beef jerky. Even so, it still smelled and squished and sagged.

I found tubes and tendons and muscles, an enormous doughnut-shaped digestive system, and, in the center of the toroid, a large, highly developed brain. I also noted a thick second skin on the inside of the bag. Finally I staggered outside into the purest air I can ever remember breathing. The tang of the mist on the breeze was like wine.

I took a last careful look at the flap of skin I had cut free. When examined under the magnifying lens of my penlight I saw that the skin was not composed of one layer, but rather of dozens of bands or striations, like the rings in a tree. I cut a six-inch section free and carried it back to the aircar.

"Whew! What's that stink!" Lester complained, waving his hand in front of his face as I slid inside.

"Those humps out there are dead Gasbags, dozens of them, hundreds, maybe."

"What did you do, crawl around inside one of them?"

"Yes, I did. See these layers in this piece of skin? I suspect they might be alternating sheets of conductors and insulators."

"You're saying the creature's a big capacitor?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"I think it might be. If you could check the dielectric constant of the insulating layers we could calculate the maximum charge one of the 'bags could hold."

"You want to be sure it's them that killed the Spiders?"

"I want to be sure it's them that *didn't* kill the Spiders."

His natural curiosity piqued, the Elf pulled on work gloves, then opened his tool kit and began his tests. I closed my eyes and reviewed everything I could remember about electricity in general and lightning in particular.

"You guessed right, it seems," growled Lester eventually.

"The entire 'bag is a capacitor?"

"If it's all like this."

"How much charge could it hold? And what do you think its maximum operating voltage would be? How far could a 'bag send a bolt in Valhalla's atmosphere at sea level?"

"I'd have to guess at the bag's operating voltage. The dielectric constant and breakdown voltage of the insulator layers would be different when this thing was alive than they are now."

"Just do the best you can."

Lester played with his computer. "Fifty, sixty feet would be my guess. Maybe as much as a hundred for that big fella we saw this morning. Not much amperage, of course."

"That's more or less what I've calculated too. There's no possible way a Gasbag could have generated the bolt that killed Raji Kav."

"Then it's just random lightning after all?"

"Not necessarily. One of the first parts of a facilitator's training is this: If a question yields only impossible answers, then the query is too narrowly framed. So once we've eliminated the Gasbags as the cause of death, the question changes from: 'Why would the Gasbags attack the Octavians?' to 'Why would anyone attack the Octavians?' And instead of asking: 'How could the Gasbags have generated the killing bolts?' we now ask: 'How could anyone have generated the killing bolts?'"

Lester sniffed loudly. "So now you're postulatin' an active intelligence at work fryin' the Spiders, are you?" He tugged at his lower lip. "Well now, it seems to me that generating a high-voltage pulse is actually a pretty trivial matter. And it'd be pretty simple to establish a stable conductive path between the current source and the target provided you could keep your victim in your sights until you're sure he's fried. For centuries now golf courses and the like have been usin' ultraviolet lasers to ionize a path through the atmosphere so that lightnin' bolts can be harmlessly discharged."

"If you were in charge, how would you do it?"

"Fryin' the Spiders? Well, how 'bout a shielded aircar, a UV laser, and a generator with enough power to send a bolt down the lowered resistence path all the way to the target? But why? Who'd want to fry my Spiders, daft as they may be?"

"My thought exactly." It wasn't the Bagpipes, I knew. They had long since abandoned the planet and, besides, this wasn't their style. The Bagpipes were anything but subtle, indirect, and devious. If they wanted the planet back they would have simply landed at the Octavians' camp, ordered them all to leave, and then been baffled and dismayed when their orders were not instantly obeyed.

"Whoever it is," I said, "let's suppose they're generating artificial lightning bolts and targeting their victims from a shielded aircar as you suggested. And suppose that we wanted to locate these people. Could you build something that would detect them?"

"At what range?"

"Ten miles?"

"Why not a thousand—it'd be just as easy in this hellish atmosphere. If I had a fully stocked laboratory and a couple of assistants I could cobble something together in two or three days, but here?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Given the parts on hand, what's the best you could do?"

"Well," Lester said, drawing out the word and stroking his chin, "if'n I was to remove the radar from the Mandator General's personal car and tinker with it a bit, and if I knew exactly where to point the thing, I might be able to find your villains within a mile or so."

I turned away and stared blankly at the husks of dead Gasbags. For Lester's contrivance to work we'd first have to know at least approximately where to look. Our technology was useless. Someone would have to physically spot the aircar. The only candidates for that job were the Gasbags. If I could figure out a way to reach them, the translation system I had used to talk with the Bagpipes might make communication possible. But were the Gasbags intelligent—and would they understand what I wanted, or care?

"Could you modify the radio from an aircar to interface with a data unit from my ship?"

"Of course. Do you think I'm an incompetent?" Lester was deeply insulted. "Child's play."

"How long would it take?"

"I said I could do it, not that I would. It's still the Spiders who give me my orders."

"Don't you think they want to stop these killings?"

"With Spiders, you never know. But it's up to them to tell me so. You can ask 'em when we get back—tomorrow." The Elf glared at me challengingly, then shifted back in his seat, closed his eyes, and went to sleep.

The next morning, finally back at the *Venture*, I got rid of my soggy clothes, showered, lingered over a lengthy breakfast, and spent a couple of hours with the ship's computer. Finally I decided that I was ready for another confrontation with the chief Octavian, Roderick Horvath. Gritting my teeth, I stepped out into Valhalla's eternal drizzle.

The octopus tentacles of the Mandator General's cloak rippled in agitation as I strode unannounced into his office. Once again he was in the company of Glaxia Fortinay and he looked ready to nominate her as the next Octavian to join the late Raji Kav. I grinned to myself. Divide and conquer was a primitive concept, but still an effective one.

As soon as she noticed my presence Fortinay cut off a sharp word in mid-syllable and glared at me angrily.

"Well?" snapped Horvath with only slightly less hostility.

"Would it be worth the plasma synchronizer that I need to get me off-planet and out of your hair to know with absolute certainty whether or not the Animi Flotati are responsible for the deaths of your associates?"

"Ridiculous!" Fortinay snorted. "You're nothing but a disbarred Facilitator—how could we trust anything you say?"

"A good question. The answer is: I would back up whatever assertions I made with concrete evidence."

Roderick Horvath's scowl deepened. "Proof?" he repeated, then turned back to Glaxia Fortinay. "If we knew the Flotati were deliberately killing us, or better yet, if we knew that they weren't, then we—"

"Surely you're not going to listen to this . . . this rank failure, are you? Even *you* couldn't be so foolish."

Horvath's lips tightened in anger and he turned back to me. "Do you have such proof?"

"Some of it, and I can get the rest. As you can imagine, the database that a Senior Facilitator, even a disbarred one, carries with him, is quite extensive, and his AI is the best on the market. Using them, I've come to a number of working hypotheses."

"Which are? No, do be quiet, Glaxia, let him speak!"

"Thank you, Dr. Horvath. What I've found is this: depending upon the conductivity of the atmosphere and the ori-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

gin of the strike, natural lightning bolts are usually in the range of ten million and one hundred million volts at between one hundred thousand and five hundred thousand amps. Because of the shifting nature of the conductive path and the violent reaction of the body being struck, natural lightning bolts usually remain in contact with a human victim for only a few milliseconds. People who are killed by lightning generally die from heart failure or interference with their neural functions. They almost never are burned in the way that Raji Kav was. As we all saw, however, he suffered extensive burns consistent with a sustained high-amperage current flow."

Horvath swirled the cloak around his shoulders, sighed, then gestured me to a seat. "Very well, I will at least accept that as a working hypothesis."

I nodded. "Those facts are easy to verify. I instructed my computer to run several simulations of electrical strikes at various voltages, amperes, and durations and to derive a table of values that could result in the expulsion of one, but not both, eyes and the charring of the flesh on two toes. The boundaries for the computations were that both eyes were not vaporized nor was the body as a whole burned. The possible values were, of course, the mutual intersection points of the range of voltages, amperages, and durations of exposure that could cause such physical effects."

Once again Glaxia Fortinay snorted angrily, but she made no move to leave.

I pulled a small computer from beneath my coat and turned its screen towards the Mandator General. "As you see, it is immediately apparent that a strike within the expected range for natural lightning bolts would not only have had to remain in contact with the body for about fifteen times longer than normal, but also the window of time variation at that high a voltage level is very small—just a little bit longer and both eyes would have gone; just a little bit shorter and neither would have been lost. However, as the voltage and amperage of the bolt decrease, the duration of contact that would have produced the observed result widens. In short, a relatively low voltage bolt that remained trained on the target for a relatively long period of time could have caused the observed effects with a reasonable margin for error."

Roderick Horvath nodded as if he followed me. Perhaps he did.

"In short, the bolt that killed Raji Kav was not a natural lightning bolt. The only explanation that makes any scientific sense is that the bolt was both artificially produced and also aimed at the target with contact deliberately maintained long enough to make certain that the victim was killed."

"Well, so far, then," sneered Fortinay, "in about a million words, you've told us absolutely nothing new at all. It wasn't lightning, therefore it was the Animi Flotati!"

"That's an unwarranted conclusion. First of all, the Gasbags do apparently follow you Octavians every chance they get, but most of the time they seem merely curious, not hostile. Nor, from what I've learned, is there any obvious distinction between the people who have been attacked and those who haven't."

"That proves nothing!"

"I agree, so I undertook further research. Have you ever heard of the so-called, and almost certainly mythical, Elephants' Graveyard? The place on Earth where all elephants go to die? For many years Terrans actually searched for such graveyards, hoping to find a vast treasure of ivory tusks for the taking."

"I seem to have heard of such a fantasy," conceded Horvath, "but what has this to do with our present situation?"

"Quite a bit." I related what Lester and I had discovered in the Gasbags' graveyard.

"Sacrilege!" sputtered Fortinay. "How dare you disturb the—"

"Be quiet!" Horvath appeared to re-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

flect. "You say that Crisp did the calculations on the Flotati's capabilities, that he agrees that the entire bag could function as a capacitor?"

"He will confirm the figures. What they show, of course, is that it's a physiological impossibility for the Gasbags to be killing your people from a distance of farther than fifty or sixty feet, which is contrary to the observed facts. In all of the deaths where the lethal bolts appeared from within cloud cover at least several hundred feet above the ground. So if naturally generated lightning isn't the cause, and if the Gasbag aren't at fault, then the question is: Who is? And why?"

I turned to the Mandator Adjunct and gave her an infuriatingly patronizing smile. "Surely, Ms. Fortinay, you will agree that those are questions whose answers are worth a plasma synchronizer?"

"Impossible!"

"Dr. Horvath?"

With a sigh, Horvath began to tap the surface of his desk with the tips of one of his eight-digited hands.

"Absolutely not, Howe!" Fortinay barked.

"Glaxia, if you please—"

"We're not giving you our synchronizer!"

"Excuse me, but isn't Dr. Horvath the Mandator General? Isn't this his decision to make?"

"I'm not going to allow—"

"You're not going to allow?" echoed Horvath incredulously. "When you hold the office of Mandator General, then you get to make such pronouncements. Until then, Glaxia, perhaps you'd best help Motry catalog the symbol stones."

"Roderick, you can't possibly—"

"Don't presume to tell me what I can and cannot do," Horvath said flatly. "You'd best hurry—Motry's waiting for you. As for you, Mr. Howe, precisely what is it you propose?"

"He's agreed to lend you an aircar?" marveled Lester, his gargoyle's face turning even craggier.

"Of course, once I reasoned with him."

"Hrmph," snorted the Elf. "Well, well, now I've seen everything!" Shaking his head, he turned back to the apparatus he was tinkering with on a bench in the recesses of his main workshop. "So what are you gonna do with this precious aircar, then, other than most probably wreckin' it?"

"That's why I've come to see you. Dr. Horvath has agreed to authorize the construction of the modified radio we discussed. How long do you think it will take?"

"Just what do you think this is I'm doin' right now?" Lester asked, punctuating his question with a minute twist of a tiny screwdriver.

"Lester, you're a marvel! I'll bet that in secret you occasionally smile at old ladies and little children."

"Not so's you'd notice," muttered the Elf, but I thought to detect a tiny glint of pleasure on his basilisk face.

"So, how does it work?"

"Figgered it'd be easiest to modify the standard radio to accept your data through the original antenna port." Lester patted the unit on the bench. "I still don't understand why you want to use the frequencies you specified. Nothing but hash on those channels."

"Unless I'm badly mistaken, that 'hash' is the sound of the Gasbags talking to each other. If I'm right, they communicate by radio waves powered by the electricity they store in the walls of their bag. It just sounds like static to us, so everyone on the planet's been actively avoiding those bands. When will it be ready?" I asked, nodding at the device.

"In about thirty seconds if you stop botherin' me long enough to insert the powerpack."

"Excellent. Here's the input unit." I handed Lester the translation device the Bagpipes had built for me months ago so that we could communicate despite

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

our vastly different language systems.

"Hmm," Lester muttered as he examined the construct. "Standard XG-46 output connector, I see. You're sure the data stream is within normal range?"

"It won't burn out your radio if that's what you mean."

"I suppose I'll have to take your word for that," he said sourly. The Elf's nimble fingers connected the cables and strapped the two units together with static bond tape. "You bein' a facilitator, you probably know what a kluge is, don't you?" Lester shook his head in disgust at the makeshift bundle. "It's a sad day when I make something like this."

"As long as it works . . . ." I answered, gently taking the device from his hands. "Shall we try it?"

Lester nodded grudgingly and we walked to the nearest aircar. Forty minutes later I stood at the edge of the Artifact. Ignoring the Elf's cynical expression, I used my binoculars to search the sky. A wire led from the shoulderbag containing Lester's transmitter to the headset that pressed a piece of the Bagpipes' special crystals against each of my temples.

"Might those rocks be bone-conduction transducers?" asked Lester querulously.

"No."

"Thought not. Mind tellin' me how you're supposed to talk to the monsters with only those two gimcracks stuck to your skull?"

"They receive and generate a neural interference pattern which is translated into electrical energy by my unit, which in turn interfaces with your transmitter."

"Ah," grunted Lester sardonically. "Why didn't I see that myself?"

Soon enough I saw a large Gasbag beginning to drift our way. I pressed the switch on Lester's transmitter. From the headset I detected nothing at all.

The 'bag drifted over the Artifact and continued towards us. Still nothing. I reached inside the shoulderbag and twisted the transmitter's power level to maximum. As the gain increased I felt a peculiar shuddering in my brain as if my skull had been pressed against a vibrating panel. In Valhalla's diffuse afternoon light the approaching Gasbag's shadow passed over me like a thin, gray cloud.

"Can you hear me?" I tried to project the question through the device. More tremors and buzzes flickered through my brain with the slightest tantalizing hint of meaning just beyond my grasp. I reached back into the bag and tweaked the radio's frequency selector slowly up and down the range I had selected as possibly being used by the creatures. My research had indicated that my target frequencies appeared to contain data encoded in an amplitude modulation format, a transmission scheme so primitive in comparison to contemporary spread-spectrum devices that it was no wonder that the Spiders would have interpreted the Gasbags' communications (if that's what they actually were) as mere noise.

". . . whispers . . . ." I thought I heard somewhere in my mind. I returned the control to the setting that had brought the response.

"Can you hear me?" I projected again. Now, suddenly, a wisp of thought drifted into my mind:

"Who whispers?"

"I do. I'm standing right below you. Can't you see me?"

"Voice in my mind, show yourself." From my brief autopsy I knew the Gasbags possessed organs that appeared to be eyes, but I couldn't be sure of the wavelengths to which they responded. Perhaps their vision was concentrated in the infrared. I took a handkerchief from my pocket and waved it over my head in hopes that the movement would be detected.

"I'm waving my arm. Can you see me now?"

"I see only a . . ." A concept flickered through my head that my brain struggled to translate as: "Crazy, frightened, two-legged animal who cannot hear."

"That's me," I told the Gasbag. "I

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

would like to talk with you." I sensed a feeling, an emotion, from the Gasbag—something between shock and cautious relief.

"Many times we have tried to call your people but you always run away. Why are you here?" Did he mean here on Valhalla or here at the Artifact?

"I am a friend of the ones who built the Artifact," I answered and projected an image of Black-Ringed Tubes, one of the Bagpipes I had met on New Sonora.

"Yes, yes, yes!" the Gasbag's thoughts exploded in my mind. "The Builders! The Builders! They told us to watch this place for them until they returned. Are they coming back? Have you come to prepare the way for them?"

"No, not as far as I know. They gave me the device that lets me talk to you. That's why I am the only one of the—" I searched for the concept to describe humans, finally settling on something like "two-legged creatures who cannot fly" "—who can hear you. I may be seeing the Builders soon. Can I give them a message for you?"

"We wait! Tell them we wait for their return." The Gasbag version of the Cargo Cult, I thought, remembering the old Earth story.

"I would like to ask you about the two-legs who were killed by the . . ." I projected the image of a bolt of lightning striking a man. A sensation passed through me like the combination of a bitter taste and foul smell. Clearly an unpleasant topic as far as the Gasbag was concerned. "What happened to them? Who killed them? Did a—" I visualized a Gasbag "—do this?"

This time the stench of burned rubber and taste of sour bile filled my mind.

"I'll take it that's a 'No.'"

"We did not hurt the two-legs. We would not. We are not crazy. It was the others who look like you." Those at least were the words that my brain created but the Gasbag's message included a brief flickering picture that didn't look human.

"Show me again what these people look like." The image of a faceless orangutang with only a gray-furred neck protruding from his shoulders formed in my brain. It was an image that I, as a Facilitator, knew well. "These creatures are not of my kind," I told the Gasbag. "They are another race we call 'Flatfaces' and they should not be here on Valhalla."

"They are here."

"Where can I find them?"

The Gasbag projected an aerial map into my mind. I picked out the scratch in the earth that for the Gasbags symbolized the main Octavian camp. Far to the north was the dead cone of a volcano, its caldera now filled with water. At the northern slope inside the cone, near the water's edge, was a flickering speck that apparently marked the location of the Flatface encampment.

"How did the Flatfaces kill the two-legs?"

The Gasbag projected another image, this one of a medium-sized aircar composed of planes set at odd angles, something I recognized as a radar stealth design. From the aircar a glowing line speared toward the earth, then settled on the blockish image of a human. The line flashed a searing white and the man-shape writhed in agony, the beam continuing to touch it until the victim lay still.

"Why do they do these things?" the Gasbag demanded angrily. "Wrong, wrong, wrong!" the creature's thoughts screamed in my head.

"I don't know the reason, but I'll find out."

"They should not do this."

"I will stop them."

"Yes, yes, yes!"

"Will you help me?"

"What must I do?"

"Watch the Flatfaces until I am ready to act. Warn me so that they cannot kill any more two-legs until I am prepared. Can you do that?"

"Will you hear me if I call?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Can you talk with the other . . . ?" I projected an image of a pod of Gasbags. In an instant the words "the Serene People" slipped into my mind.

"Yes, of course."

"Then have one of the Serene People remain near the main two-legs camp. Another will wait near the Flatface camp. Others will wait in between. Each will talk to the next until the one near the two-legs camp receives word and he can tell me. Will you do that?"

"Yes, yes, yes," echoed the creature's reply. I was about to leave, then turned back to the Gasbag.

"My name is . . . Great Thinker," I told it. "You are called . . . ?"

"Waits For Visitors," came the reply. Apparently, this Gasbag was the designated welcoming committee for the Bagpipes, if and when they decided to return.

"Thank you, Waits For Visitors. I will make preparations to stop the Flatfaces. Goodbye." I waved at the hovering Gasbag, removed the headset, and grinned at Lester.

"Were you actually talking to that beast?"

"Yes. Would you like to know how to talk to the Gasbags?"

The Elf appraised me slyly. "Couldn't hurt, addin' it to my repertory of engineering knowledge," he agreed cautiously.

"Good, because I was thinking that when I was ready to leave Valhalla it might be a friendly gesture to supply you with a complete set of schematics so that you could help the Octavians talk with the Serene People, provided you kept it strictly confidential and didn't sell the design or anything like that."

"In return, I suppose, for my ongoing cooperation?" he asked sourly.

"Now, Mr. Crisp, when have you ever been anything but cooperative?"

Two hours later, having returned Lester to his duties, I was at the upper limit of the aircar's ceiling, a little more than thirty-thousand feet, slowly circling the area indicated on Waits For Visitor's mental map. Looking down through the aircar's canopy as it banked in an endless circle there was nothing to see except clouds, mountain wilderness, a few scattered lakes, and the gaping mouth of what, geologically speaking, must have been a comparatively recent volcano. Given the turbulence of Valhalla's weather and ubiquitous cloud cover, it was a wonder that I could see anything at all.

Finally I descended and positioned the aircar just behind the southern edge of the caldera, then carefully set it down on the edge of the volcanic rim. In the fading afternoon light the inside of the caldera was a symphony in hues of gray, from the pewterlike water a thousand feet below me to the charcoal shadows of the northern wall two miles away. I peered through my binoculars.

At the edge of the lake was a rocky outcropping covered by a scraggly copse of dark green trees. Part of it, however, appeared to be a carefully camouflaged dock. From the air it would look like an extension of the small promontory. From my perspective, however, I could see a tunnel-like structure flanked by trees, and, concealed within its darkness, a fairly sizeable ship, one at least six times the size of my own little flyer.

I boosted the magnification to maximum and studied the craft carefully. It appeared to have orbital capacity and I wondered if this was really the ship that was being used to direct the lightning bolts. No, undoubtedly there was a smaller craft concealed within. I was just reaching for my camera when I saw two dim figures moving along the craft's length. A moment later a camouflage cloth mimicking gray rocks was pulled across the end of the opening and the ship vanished.

No matter. Even without pictures I had seen all I needed. Now, I muttered to myself, as I turned my aircar and re-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

treated behind the caldera's edge, all I could hope was that whoever was inside the tunnel hadn't seen *me* . . . .

"There really are Flatfaces on Valhalla then?" growled Lester Crisp skeptically.

"Yes."

"And you think these Flatfaces are fryin' the fine Spider folk who pay my salary?" The Elf's scowl grew even darker.

I nodded. The Flatfaces, officially known as the Cogitators, were one of the seven alien species with whom humans uneasily coexisted. Their own sphere of influence was somewhere beyond the northeast quadrant of Human Occupied Space and our dealings with them were sporadic and strained. Trade was nonexistent; the Cogitators actively discouraged cultural and scientific exchange, and their presence in HOS was nearly as rare as that of the recently encountered Bagpipes.

"You actually saw these creatures?"

"Very briefly, but their orangutan resemblance is unmistakable."

It had, in fact, been a tossup between humans calling them Flatfaces or Orangutans since each term was equally descriptive, but the former had probably won out because it sounded more derogatory. Vaguely bipedal, the Cogitators had pendulous arms, stubby legs, and a long, thick, flexible neck that ended not in a head but simply and disconcertingly just ended. The end of the neck was as perfectly round and flat as if a head had been lopped off by a guillotine.

One large multicolored, multifaceted eye was set directly in the center of the neck and was the species' only apparent sensory organ. Possibly it served auditory purposes as well but the Flatfaces categorically refused to answer any questions regarding their physiology. Their speech, at least when conversing with humans, was generated somewhere within their torsos and emerged as a flat basso profundo monotone. How they communicated among themselves was still a matter of speculation.

"Orangutans are some sort of animal?" demanded the Elf.

"Terran primates—hairier than Flatfaces, and barely sentient, but otherwise quite similar."

"So what are you plannin' on doin' now?"

"Right now I'm going to bed—it's been a long day. I'll tell the ship to monitor the frequency that Waits For Visitors used to talk with me. Horvath can wait till tomorrow."

"Attention, Isaiah Howe! Attention—"

"All right, Ship, I'm awake!" I shook my head blearily. "What is it?"

"There has been a significant increase in the usage of the specified radio frequencies."

I flipped on Lester's kluge and slipped the crystal headband over my skull. A fuzzy picture of a Flatface floated through my mind, then shrank to a point suspended above a map of the surrounding area. I recognized the dead volcano at the top. The dot moved west, then the map flickered and the sequence repeated again. I pulled off the headset and hurried to the control room where I brought up an aerial view of Valhalla on the ship's screens. The only area I recognized in the direction the Flatface aircar was traveling was the spot I had marked with the notation: "Elephants' Graveyard."

Stopping only long enough to grab a poncho and to slip my feet into a pair of high-top rubber boots, I sprinted through the drizzle to the Octavian headquarters.

"Where's Dr. Horvath?" I panted to the pear-shaped Damon Motry.

"He and the Mandator Adjunct have gone out to that graveyard place you—"

"What!"

"They'd been having an awful fight, then they up and—"

I didn't hear the rest, as I was already out the door and running for Lester

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Crisp's workshop. "The Flatfaces are on the move," I shouted. "We're going to need whatever protective gear you've come up with."

"I've just now finished it," the Elf said as he reached for his waterproof boots. "Help me lug it out to the car." Moments later we rose into the perpetual overcast. On the floor behind us rested a high-tech lightning rod.

"Well, what *better* way to protect against a lightning bolt?" Lester Crisp demanded querulously. "It telescopes up to thirty feet high, and the top ten feet extrude four-foot whiskers, which give it a capture zone eight feet across. If we stick it up anywhere in the vicinity of where a lightning bolt will strike, it ought to take the charge instead of us."

I nodded distractedly, my attention focused on maintaining contact with the Gasbags through my jerry-built communicator. Every few seconds the Flotati updated the position of the Flatface aircar. "Looks like we'll beat them to the Graveyard by a minute or two," I said eventually. "Can't we go any faster?"

"If wishes were fishes . . ." the Elf growled.

When we finally grounded, the Flatface dot had almost merged with the graveyard's location on the Gasbag's mental map. Lester wrestled his construct through the rear cargo door while I slung the communicator over my shoulder, then ran to the rear of the aircar. Both of us carrying the lightning rod would be too clumsy, so I handed the Elf my shoulderbag, grabbed the unwieldy device from his arms, and trotted into the mist-filled valley.

"Horvath!" I shouted. "Dr. Horvath, your life is in danger!" The farther I tramped through the muddy ground the heavier the pole seemed and the slower my steps became. "Dr. Horvath!" I called again as I rounded the mummified carcass of a long-dead 'bag.

In the dying echos of my shouts I heard the muffled sound of human voices, then a sharp ". . . .miserable creature!" Glaxia Fortinay's high-pitched voice carried through the thick mist better than Horvath's lower tones. Finally I made out their vague forms two hundred yards ahead of me. I took a deep breath and trotted forward as fast as I could.

"Dr. Horvath!" I called again when I was about fifty yards away. The two of them swung around.

"You're defiling the Flotati's sacred place!" Fortinay yelled. "Leave at once!" She turned away, yanking Horvath after her. "I've told you a million times, Roderick, that if you don't delegate more of your authority and let—"

"Wait!" I screamed at them. "You're in danger! Come back!"

The Mandator General hesitated, then stopped and eyed me quizzically. Fortinay hissed something, then stomped off deeper into the graveyard. Panting, I stumbled to a halt next to Horvath. "You're in danger," I managed to gasp, then paused for a deep breath before continuing. "The Flatfaces are almost here."

"The what? Howe, have you lost your mind? And what is that thing?" Horvath pointed to the pole that I was already extending, with whiskers deployed, over our heads like a neo-modern robot umbrella.

"There's a shielded aircar up there that's about ready to target you with a lightning bolt, just like Raji Kav and the rest of them."

"Shielded aircar? Who would—"

"If you lose this world, then under the St. Simeon Accord wouldn't the Flatfaces take over?"

"'Flatfaces' is a derogatory term. The proper name—"

"They're the one's who'll get Valhalla, aren't they?" I demanded as I finished deploying the four folded supports that served as the lightning rod's base.

"Well, yes, but they wouldn't kill us over that." Horvath paused. "*Would* they?"

Standing next to a Gasbag's corpse

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

about thirty yards away Glaxia Fortinay shouted: "Roderick, stop talking to him and—"

She was out-shouted by Lester from somewhere behind us. "I see the beam!"

The Elf dashed into the shelter of the pole's whiskers, then peered upward through the insect eyes of a pair of UV detector goggles. "It's behind you!" the Elf yelled at Horvath. "Quick, get on this side of the pole!"

I grabbed the Octavian and jerked him violently to our side of the lightning rod. An instant later there was a deafening snap like the crack of a giant whip and a beam of electrons slammed into the pole.

"Does that answer your question?" I shouted over the ringing in my ears. "Lester, give me the communicator. I need to talk to the Gasbags."

I slung the bag over my shoulder and fumbled with the headset while the Elf searched the clouds for another ultra-violet guide beam.

"You can actually converse with the Flotati," Horvath marveled, pointing at the communicator, "through that thing?"

"Right now I'm calling my friend, Waits For Visitors, to see if he can keep the Flatfaces from killing us. And, one more thing, Ms. Fortinay's in the gravest possible danger if she doesn't get over here."

Horvath looked from the communicator to the pole, then to Glaxia Fortinay, who was still glaring at us from the shelter of her Gasbag. "Glaxia, come here!" he ordered imperiously. "Hurry, or the, ah, Flatfaces will get you."

"Beam," Lester snapped, "behind us!" The three of us spun a hundred eighty degrees around the pole and a moment later a glowing line passed through the air where we had just been standing. I adjusted the crystals against my temples and closed my eyes.

"Roderick, get away from Howe," cried Fortinay. "The Flotati are only trying to punish him for his sacrilege!"

"Waits For Visitors," I called, visualizing the giant creature. His image came to life, and partly in words but mostly in images we began a hurried conversation. "Can you and your friends get near that machine?" I pictured the Flatface aircar.

"Yes, yes."

I visualized lines of ionized air running from the aircar down to our position as red streaks. Then I conjured up the picture of a dozen Gasbags firing their charges into the aircar on the side opposite from where the red lines emanated.

"Can you do that, send your electricity into the opposite side of the car?"

"Yes? Yes?" came the uncertain response.

"Will you try?"

"Yes, yes, yes." That was all I could hope for. I jammed the headset back into the bag.

"They'll try to bring them down," I said.

"A neat trick," the Elf grumbled. "You do know why it's impossible to electrocute a bird sitting on a power line?"

"Of course—there's no path for the electricity to follow through the bird to ground. But there *is* a path through the aircar to ground."

Lester shook his head. "That car's at five hundred, maybe a thousand feet. Your Gasbags don't have the voltage to send a charge from there to earth. You said so yourself."

"Not through the normal Valhallan atmosphere, but the air between us and the Flatface car isn't normal. Each of those beams has ionized the hell out of it. There are multiple low-resistance paths from the car to ground, especially if the Gasbags time their bolts to coincide with the car's next shot. If that car is between the Gasbags and a nice column of ionized air to the ground, the Gasbags' bolt will pass right through it and—"

Something painful crashed against my ear and I found myself tumbling help-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

lessly to the ground. Had a bolt of lightning somehow made it past—

"Roderick, either come with me now or suffer the same fate as these two!" With enormous difficulty I twisted my head. I saw Glaxia Fortinay gripping the lightning rod with one hand while the other was fastened around Horvath's upper arm as she tried to drag him away. Lester? I wondered groggily. Where was Lester?

"But, Glaxia, you can't possibly . . . ."

"No? Of course I can! Oh, why am I bothering with you? You *know* it should have been me that was given command of this expedition! Fine, then stay with them!"

I had managed to struggle to my hands and knees when I noticed Lester lying nearby, his hands clutched to his neck. I was reaching for him when Glaxia pushed Horvath at me. Once again I went sprawling, this time with Horvath and the eight arms of his octopus cape entangling me.

As I struggled to free myself I heard Fortinay striding away, the lightning rod clasped firmly in her hands. Thrashing frantically, I made little progress against the coils of Horvath's fiendish cape. "Lester!" I shouted, "get this damned—"

But the Elf had vanished. A moment later I cleared enough of Horvath's cape to see Lester bounding with amazing speed after Glaxia Fortinay. The Elf wasted no energy on argument. Without pausing, he threw himself on the Valkyrie's back and bore her to the ground, then yanked the lightning rod from her hands.

"Lester," I cried to the struggling figures before me, "get away from her! Get back to—" But the Elf didn't need instructions from me. He was ten feet from Glaxia Fortinay and running hard when the Flatfaces fired their last shot.

For the third time a deep yellow beam boiled out of the clouds. It caught Glaxia Fortinay full in the back. Her body arched and she uttered a single horrible cry. At almost the same instant the low-hanging clouds flickered with multiple bolts as the Gasbags released their charges into the aircar. An earsplitting crack echoed across the sky followed a moment later by a fireball tumbling out of the overcast. Fragments of metal, glass, and plastic rained down, the remains of the aircar careening toward the ridge marking the eastern boundary of the graveyard. There was a sharp, terrible noise as the craft smashed into the earth, then total silence.

The crushed, mangled, and charred bodies of the six dead Flatfaces that were scattered about a fair portion of the landscape were not a pretty sight. "I'd collect the bodies myself," I told the unhappy group of a dozen Octavians who ringed me, "but it would take too long. We have to be realistic. Unless you want to find yourselves in an outright war everyone is going to have to make some compromises. And that's my speciality: effecting compromises."

As I talked, I had reluctantly begun to gather up fragments of Flatface bodies and lay them on one of the six pieces of heavy plastic sheeting we had arranged on the ground. Even with gloves, mask, and medical gown, there was only so much I was able to do: the Flatfaces remaining at Dead Cone Lake would have to match the arms and legs to the appropriate torsos.

"So much killing," murmured a rawboned young woman with an overbite as she distastefully maneuvered a piece of blackened body with a shovel and stick. "All this just so that they could occupy Valhalla? Couldn't they see that we'd never leave? Even if they killed us all, there would be plenty of other Octavians to replace us."

"I don't think the Flatfaces read the St. Simeon Accord the same way as you do."

The Accord went back three and a half centuries, to the time that a dispute over a planet in the newly discovered Weatherby system had nearly led to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

open warfare between humans and the strange species called the Waterbubbles. Six Senior Facilitators had eventually hammered out an agreement that ever since had maintained an uneasy equilibrium among the space-going species.

The treaty provided that if one race discovered a planet in an area between two generally recognized spheres of influence, the other nearby species would be notified of the discovery. If that race also indicated an interest, the world would be added to a list of disputed planets. Every fourteen Terran months first one species, then the next, in alternating fashion, would choose a planet from the list. When all the planets had been picked, they could be traded back and forth. Once having committed to a particular planet, however, it had to be developed or utilized in some carefully defined ways within a five-year period or the rival species could reclaim it.

A search of my database told me that Valhalla had originally been discovered by the Flatfaces. It had, however, been selected by the human authorities, and eventually ceded to the Octavians. Evidently the Cogitators, or least a renegade band of them, had not taken that as the last word on the subject.

I sighed as my gaze moved over the horribly scattered remains of dead Cogitators and my thoughts turned to the only slightly less grotesque Octavian corpses I had recently had to deal with. I thought I knew what the Flatfaces considered valuable enough to risk the sanctions invoked by violating the St. Simeon Accord.

The concealed Cogitator base, though well-hidden from prying eyes, was so brilliantly lighted as to be nearly blinding. Well, Senior Facilitators are nothing if not prepared. My polarized sunglasses flicked to maximum and I turned my attention to the first live Flatfaces I had ever encountered. We were standing in the main cabin of the Cogitators' grounded spacecraft. My aircar, the largest one the Octavian settlement possessed, was perched somewhat precariously in a tiny clearing at the edge of Dead Cone Lake. Inside, in six hermetically sealed rolled sheets, were all the Flatface remains we could gather.

After carefully making my way to the edge of the clearing, I had arrived at the point where the Flatfaces' camouflage cloth was attached to the rock. It had taken five minutes of shouting before a Cogitator had appeared and reluctantly led me through the barrier. Inside, their ship floated tranquilly on inky water. A hatch opened in one side and I stepped into its blinding interior.

"Facilitators are trained to regard events impersonally," I told the four Cogitators who faced me in a semicircle, their enormous eyes at staring at me impassively from the ends of their flattened necks. All of them, I was interested to see, wore dark purple uniforms instead of the red that was considered standard garb for Flatfaces. "Nonetheless, most facilitators would resent attempts to murder them. I'll try not to let it interfere, however."

"We did not attempt to murder you," rumbled a deep bass monotone from somewhere within one of the four Flatfaces.

"Perhaps not. But the six dead Cogitators just above us in my aircar most certainly did." I gestured at the ceiling and saw that Flatface reactions were close enough to those of humans for their long, thick necks to crane upwards.

"You killed our associates?"

"They killed themselves by attacking us. By doing so, they finally provoked this planet's intelligent beings, the Flotati, who do not permit wanton murder. A number of Gasbags directed electrical bolts at your associates' aircar. The result was their deaths. I am returning their bodies for appropriate rites."

"You said you were returning the remains of our crewmates. What of their ship?"

"Sadly, the craft was completely destroyed."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

A long silence ensued. When it was finally broken, it was evident that Cogitators, or at least these particular four, had no future as negotiators.

"Our primary deflection sensor array was used to construct the aiming mechanism installed in that ship."

"You don't have a backup system?"

"None was deemed necessary. We had determined that the humans possessed no weapons that were of any threat to our craft."

"You can't return home without this equipment?"

"We can, but at a reduced efficiency."

"How long will it take you to make your home port?"

"Approximately 6.4 Terran standard years. Unfortunately, we have food and energy supplies for no more than four years in transit." I could hardly believe that supposedly intelligent beings could give away so much ground in so few words.

"You realize that your actions are in violation of the St. Simeon Accord, are tantamount to acts of war."

"Yes."

I almost shook my head in wonderment. The Cogitators sounded as lacking in basic negotiating skills as the Bagpipes. "I have, perhaps, a solution to your problems," I said. "While I consider it more fully, would you care to retrieve your associates' remains?"

By the time the body bags had been stowed I had formulated my proposals. "If you want me to help you, I need to know what prompted your rash actions."

"Our Clan Chief discovered this planet and recognized it to be of extraordinary value, for himself, our clan, and for our species. It contains deposits of crystals which have unique properties extending their effects into non-e space. Instead of developing the crystals, you humans sit here and do nothing. That is against the intention of the Accord."

"What would you do with these crystals?" I asked uneasily. As far as I knew, only the Bagpipes were aware that these crystals could also produce effects in non-Euclidian space. The more people who knew about them, the more likely someone was going to start a war with the Bagpipes over them.

"Our Clan Chief was a Maximum Level Astrogator. It was his calculation that proper application of the crystals, in conjunction with the unique ionic disturbances in the atmosphere of this planet, would result in a powerful guidance beacon that could be used by our fleets while in nullspace throughout our entire sphere of influence."

"You'd turn the entire planet into a kind of a nullspace navigational beacon?"

"Yes."

"What would that do to the environment and the Gasbags?"

"We don't know. Why should that be a concern?"

"No reason. I was merely curious." I pursed my lips. "So you decided that if you could chase the Octavians away, the planet would eventually revert to you."

"Yes."

"I see. Very well, unless you want to stay here and face the consequences of your actions or take your chances hopping from planet to planet for the next six or seven years, this is what I propose . . ."

"So you'll be leavin' us then?" Lester muttered.

"As soon as you can install the circuit block," I said, holding out the part I had gotten from Dr. Horvath.

"You don't need me for that," growled the Elf. "Even a fumble-fingers like you could probably do with it with a little supervision, which I'll be happy to provide just as soon as you teach me how to talk to these Gasbags. That'll be something that'll have the Spiders eatin' out of my hand when the need arises." Lester paused for a moment, studied the device in my hand, and snorted delightedly. "Mandator Horvath must be a pret-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ty badly frightened Spider to have handed that over without a fight."

"I think so. I'm sure he wants to get rid of me as soon as he can—along with the remaining Flatfaces."

"You're takin' 'em with you, then?"

"Yes. They've already paid me a substantial fee for passage to the nearest Flatface world. They'll send a salvage party back for their ship. Otherwise . . ."

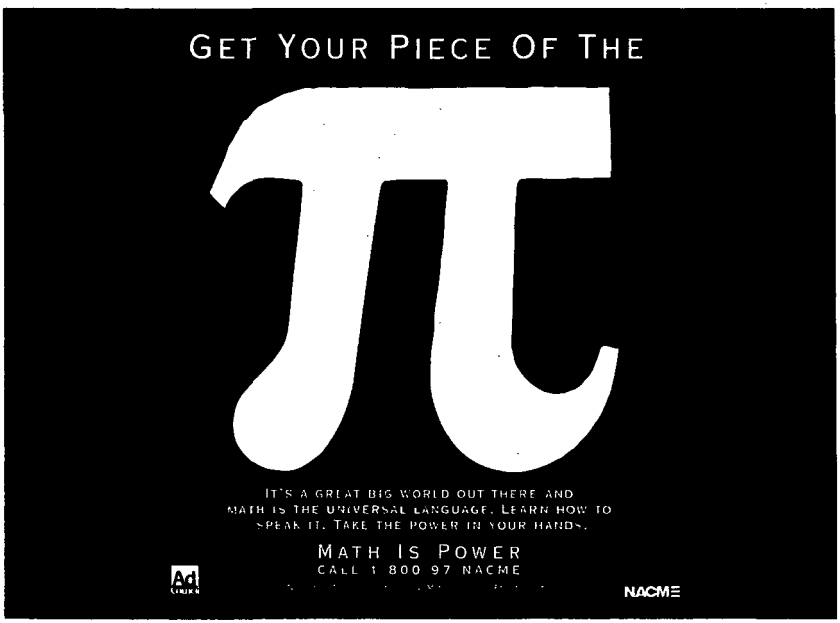
"Otherwise they might find themselves in front of a judge with Spider Horvath as the prosecutor." The Elphinstone Elf snorted again. "So everything ends up precisely the way a Senior Facilitator might have designed it to. His ship's repaired; he's got money in his pocket; his liver or whatever it is will be safe for another year from the bankers on New Zurich; and he'll be one of the first humans in decades to be allowed into the Flatface sphere. Might even find some profitable tradin' opportunities there, I suppose." The Elf's eyes regarded me with unwonted merriment. "Seems to me that for a disbarred failure, you ain't doin' so badly for yerself after all."

I considered the Elf's appraisal of the situation, then nodded. "Perhaps not, Mr. Crisp, perhaps not. And perhaps one of these days we can get together somewhere for another glass or two of Elphinstone Amber."

"Perhaps. And then you could tell me whether a clever Senior Facilitator like yerself figgered that with a field full of corpses as evidence, the Flatfaces would pretty much have to do whatever you wanted 'em to."

"Ah, now." My smile broadened. "That is something to consider, isn't it? But in the meantime, let's just keep that thought to ourselves." ■

Editor's note: Isaiah Howe appeared earlier in "Finder's Fee," April 1997.


GET YOUR PIECE OF THE
π
IT'S A GREAT BIG WORLD OUT THERE AND MATH IS THE UNIVERSAL LANGUAGE. LEARN HOW TO SPEAK IT. TAKE THE POWER IN YOUR HANDS.
MATH IS POWER
CALL 1 800 97 NACME
Ad Council
NACME

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Jeff Hecht

THE LOST GENERATION OF FIBER OPTICS

Some ideas don't flower right after they're planted. . . .

Fiber optics is a hot new technology. Its communications applications are growing at a fantastic rate. A single fiber can carry hundreds of billions of bits per second, a speed a hundred times faster than just a few years ago. Yet the idea of fiber optics is over 70 years old, and the idea of sending phone conversations on beams of light goes back—literally—to Alexander Graham Bell himself, who in 1880 demonstrated what he called the Photophone.

To be fair, Bell sought "wireless" communications before the discovery of radio waves, and his Photophone sent voices through the air on reflected sunbeams. It worked, but the telephone he had invented four years earlier was far more practical. The Photophone sat for decades in a sealed box at the Smithsonian, consigned to the special obscurity of failed inventions of famous inventors.

Nor would it be fair to say that the young electronic engineer who first outlined the principles of fiber optics anticipated modern fiber-optic communica-

Illustration by Shirley Chan

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tions. Clarence Weston Hansell's original goal was to read the dial of an instrument that was maddeningly out of sight. He realized that a bundle of transparent fibers could carry an image of the distant dial to his eye. It was the idea that would launch modern fiber optics—but not until the mid-1950s, a quarter century after Hansell had proposed it. *(See Figure 1)*

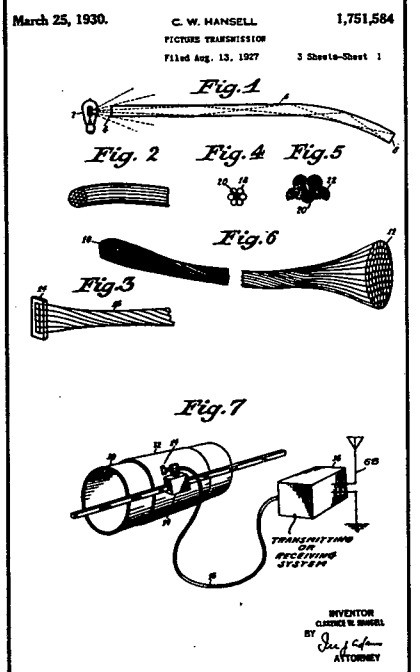
Communications systems, which send optical signals through single fibers, came after fiber-optic imaging. The basic idea dates back to the early 1930s, when Norman French patented the process of modulating light with telephone conversations and sending the signals through transparent glass rods. It might seem a short step from thick glass rods to thin fibers, but everyone in the 1930s knew that the future of communications lay with radio. Radio telephones, perfected in part by Hansell, relayed conversations across the broad Atlantic. Vacuum-tube transmitters and receivers operating at the incredible speeds of hundreds of kilohertz broadcast radio programs that entertained millions of Americans. French's idea sank without a trace for nearly three decades, only to be revived in the 1960s and brought to fruition in the 1970s.

Why were there such long hiatuses in both fiber-optic imaging and communications? The reasons were different, and you can best understand them by looking at their histories.

The Case of C. W. Hansell

The idea of image transmission came to Hansell—who went by his initials C. W.—sometime in late 1926. At the age of 28, his gift for engineering had taken him a long way from his childhood as the oldest of eight children on a poor Indiana farm. He was managing the Radio Corporation of America's radio transmission laboratory at Rocky Point, Long Island. "It would be a great help if the vision of such an instrument could be

Figure 1



C. W. Hansell envisioned most elements of fiber-optic imaging in his patent, filed in 1927.

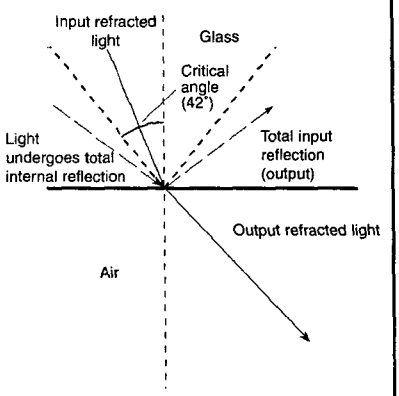
piped from one place to another around corners, curves, etc.," he wrote in his engineer's notebook on December 30, 1926.

By then he already had an answer:

It is only necessary to make up a cable of parallel laid quartz hairs or strands or similar material, the ends of which can be cut off plane. One end of this cable can face the instrument, and another can face toward the observer. The light from the instrument will fall on the ends of the quartz fibers and be transmitted through them, coming out as an image in the other end visible to the observer. No light will pass from one quartz hair to the other due to the total reflection from the walls of the quartz. Of course, the area corre-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Figure 2



Total internal reflection confines light within glass if it hits a glass-air interface at a steep angle. (From *City of Light*)

sponding to the cross section of each hair will have its particular part of the image mixed up so that its detail is lost, but the image as a whole can be made quite good by using a great many very small hairs. [1]

His notes sum up the essence of imaging fiber optics in two pages of the small bound notebook. Line up transparent fibers in a bundle with their ends properly aligned, and they transmit an image point by point. Arrange the fibers in the same pattern on each end, and they reproduce the image. *Figure 2* shows total internal reflection. He also listed other applications for his invention: "a flexible periscope, which could be quite useful in the army and navy," relaying "the reading of a gasoline meter from the tank [of an automobile] to the dashboard," and "visual examination of internal spots in the body" by surgeons who could thread a flexible bundle down the throat.

It was neither the first nor the last time inspiration struck Hansell. He was among the most prolific inventors of his generation, accumulating over 300 American patents, plus many more overseas. He didn't patent every idea that crossed his mind. It was Hansell who suggested to the young Edwin Land that his new light-polarizing plastic "would make good sunglasses." Hansell's reward was the first pair off the Polaroid production line.

In February 1927, Hansell wrote up his proposal for RCA's patent department. The patent filed six months later *(Figure 1)* contains more ideas, including some more relevant to RCA's main radio and electronics business. Several companies were working on early facsimile systems at the time, to send weather maps via radio to ships at sea, or "wirephotos" over phone lines to newspapers. Hansell thought he could speed transmission by arranging 20 fibers along a line to scan the image, instead of picking up one point at a time with a single light detector. He sketched out some circuits to use with his flat optical cable.

And there Hansell evidently stopped. His notes and patent application suggest he played with individual glass rods or fibers, but that's all. I could find no evidence that he ever *assembled* a bundle of glass fibers. He merely proposed the idea, filed for a patent, and moved on. Conceiving ideas was Hansell's gift. If they were important to RCA, he—or other engineers working with him—would translate them into reality. If not, they went into RCA's hefty patent portfolio.

RCA had plenty of other work to keep Hansell busy. The company boomed as radio technology advanced through the 1920s and 1930s. Hansell's group developed the nuts and bolts of short-wave radio, transmitters and directional antennas that sent signals across to Europe, South America, and Hawaii. He was a pioneer in frequency modulation of radio signals, and high-frequency radio transmission. He was so prolific an inventor that he may have forgotten about fiber optics; he never mentioned that idea to his family before he died in 1967.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

A Legacy of Sword Swallowers

As Hansell moved on to new inventions, a medical student at the University of Munich named Heinrich Lamm began pondering how to look down the throat to see into the stomach. One of his professors, Rudolf Schindler, had spent the past decade developing an instrument called a gastroscope to do the job. It was an old quest. Inspired by circus sword swallowers, German physician Adolf Kussmaul had tried using a rigid tube in the 1860s, only to discover that most people's throats were not as accommodating. Others assembled optics in rigid tubes, creating what a later physician called "one of the most lethal instruments in the surgeon's armamentarium."[2]

Schindler's "semi-flexible" gastroscope could bend up to 30 degrees, but Lamm decided that wasn't flexible enough after watching him use it. Lamm knew that total internal reflection could guide light along flexible glass threads. The idea came together in his mind as it had in Hansell's. He wrote:

> *Let's assume we have a bundle of very many thin glass or quartz threads, cut off on both ends in a plane perpendicular to its axis, and ground and polished in these planes, with the threads arranged in such a way that the end surfaces of each thread lie in each terminal plane on exactly corresponding sites, with clamping rings securing the two bundle ends so each thread remains at the ends on exactly its assigned site. If we then project upon one terminal surface of this bundle a real image, this image will be transmitted point by point (or more exactly, minute area by minute area) to the other terminal surface of the bundle. There one can view it directly or through an ocular lens. It will be a halftone image. If the threads get all jumbled in the middle part of the bundle (as they invariably do if the bundle is bent), the transmission of the image remains unchanged.*[3]

Lamm realized a bundle of flexible fibers would go down a patient's throat much more easily than a tube full of lenses. He also hoped it would show the surgeon more of the stomach. At times a bit headstrong, he charged forward, talking Schindler out of a little money to buy fibers and try to assemble a bundle. Lamm found space in the laboratory of physics professor Walther Gerlach and painstakingly assembled the world's first bundle of optical fibers.

It was not easy work. He had to comb the glass threads to align them in a fat bundle a few inches long, clamping the fibers together at each end, then bending the whole bundle to show it could carry light around a curve. The bundle was not very clear, but Lamm was not about to be discouraged. He focused an image of the bright filament in a clear light bulb onto one end. When he looked through the other, he could discern the bright V-shape of the filament. He photographed it triumphantly, the first image transmitted by fiber optics.

Full of the thrill of his first invention, Lamm hurried to the German Patent Office, where officials dashed his hopes. The British Marconi Company had just received a patent on exactly the same thing! It was a British version of Hansell's patent, which Marconi had licensed along with other RCA patents on electronics. Lamm wrote to Marconi, which replied that neither they nor Hansell "have tried to utilize this principle." That didn't matter to the patent office, which only certifies that ideas are original.

Most people probably would have given up. Lamm admitted that he had not been able "to transmit adequately bright and sharp images." As a student, he lacked the money, time, and resources to go further. Schindler evidently wasn't impressed—he recalled Lamm's experiment many years later,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

but thought it had failed. Lamm retained enough enthusiasm to submit a paper on his idea to a German journal, *Zeitschrift für Instrumentenkunde*. It appeared under Lamm's name alone, unusual at a time when most professors insisted on sharing credit. Yet Lamm concluded that at best he could hope "some optical firm possessed of more means, sources of supply, and experience than I have, could be induced by this report to build a serviceable flexible gastroscope."

Lamm had little chance to help. He was a Jew, and the ugly tide of Nazism was rising in Germany. He interned at the Jewish Hospital of Breslau, and after marrying another doctor the young couple fled to America in 1937. His dreams of becoming a professor of medicine were shattered, but he and his wife settled in a small town at the southern tip of Texas, where they practiced medicine until his death in 1974.

An "optical telephone system"

Norman R. French was trying to solve a different problem in the early 1930s. An acoustic engineer at Bell Labs, he wanted to send many telephone conversations simultaneously along the same path. His goal was an alternative to wires and radio, a "light cable" to transmit optical signals without routing them through the open air. On first glance, that task seems simpler than relaying an image. You need only a single optical path to send a message, not an array of hundreds or thousands of flexible fibers aligned precisely from end to end. He had the advantage of half a century's technological progress since the Photophone.

French worked some details out carefully in his patent application. He envisioned separate sources for each of many different wavelengths, with telephone signals modulating each source. The wavelengths would travel together through the light cable, then be separated at the receiver to isolate different signals. Today, that's called wavelength-division multiplexing, and it's the hottest way to squeeze tens or hundreds of gigabits per second through the 9-micrometer core of a single optical fiber. French was thinking more modestly, merely sending multiple telephone messages, and he didn't give many details.

Nor did his patent say much about light cable design. Patent lawyers seek to cover every possibility, so French's patent suggests many forms of light cable:

> *It may, for example, consist of a solid rod of glass or quartz, or similar material, which has low absorption coefficient for the wavelengths to be transmitted. On the other hand, it may consist, and preferably so, of a tube which on the inside should have a reflecting surface. Since also, over such distances as 10 to 100 miles, it is important to keep the attenuation to as low a value as possible, I would prefer to have the tube evacuated, thus assuring a minimum of attenuation due to absorption and a constancy of optical properties as weather and other conditions change.*[4]

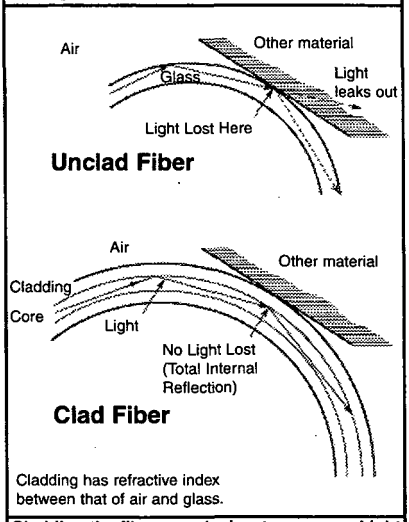
A close reading of French's patent suggests that he didn't take his ideas very far. He may never have measured light absorption by the clearest glass of the time, or calculated how much light is left after 100 reflections from a 99% reflective surface (36.6%). In fact, the best glasses of the time could not carry light 100 feet (30 meters), much less the 10 to 100 miles (16 to 160 kilometers) he wanted to go. The shiniest metal layers that could be coated inside a tube probably could have done a little better, perhaps reaching a few hundred feet (100 meters). It was no wonder French's patent was filed and forgotten.

The Quarter-Century Gap

Hansell and Lamm clearly anticipated the image-transmitting fiber-optic bun-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Figure 3



Cladding the fiber was the key to success. Light can leak out of a bare fiber into anything that touches the surface where total internal reflection occurs. In a clad fiber, total internal reflection occurs at the inside edge of the low-index cladding, a surface nothing else can touch. (From *City of Light*)

dles developed a quarter-century later, missing only one significant concept. Lamm even demonstrated image transmission. The image wasn't very clear, but it was enough to prove the concept. Yet I can find no trace that anyone else followed the same path until the 1950s, when three men independently reinvented fiber-optic imaging.

French was further from the modern idea of fiber-optic communications, although a few parallels are notable. After World War II, two RCA engineers patented a plan to transmit television signals through light guides, but they apparently made little more progress than French. Serious experiments with light-guide communications did not start until after the first laser was demonstrated in 1960.

Why the long hiatuses? An obvious reason was that the original inventors stopped work. Hansell's main interests and responsibilities lay elsewhere, in the new radio technology that RCA paid him to develop. Lamm had no one to support him beyond making his first bundle. The independent-minded student wasn't close to Schindler, and the professor was more interested in his own instrument, which proved to be an important advance. Lamm kept a copy of his paper, but as a refugee and small-town surgeon, he lacked resources to do any more.

French had more resources at hand, but he had a much tougher problem. The technology to make extremely transparent glass didn't exist in 1930. Radio could carry signals much further than the best glass, and electronics was advancing rapidly. The time was not ripe for fiber-optic communications.

On the other hand, there was no fundamental barrier to making a flexible bundle of fibers to transmit an image. The need for a flexible gastroscope remained; only physicians with careful training and the surest of hands could use Schindler's gastroscope safely. The best glasses were clear enough to carry a light the meter or two needed to examine the stomach; they weren't available as fibers, but fibers are not hard to make. The technology was available, but the idea was forgotten.

Rebirth

The rebirth of fiber optics came as the world recovered from World War II. Three Europeans independently conceived of the imaging bundle, and each was able to go a bit further than Hansell or Lamm.

The first was Holger Møller Hansen, a Danish engineer who tinkered with inventions in his home workshop while working for the giant Philips company. He had made his first invention, a message-encoding machine, as a young soldier with only five years of schooling. His feat so impressed a local businessman that he paid the young man's way through engineering school.

An archetypical lone inventor whose

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

business sense didn't match his technical genius, Møller Hansen could almost be a character from a Golden Age SF novel. In the late 1940s, he saw the need for a flexible gastroscope, and decided to try a bundle of glass fibers. Experiments soon showed him that the fibers did not transmit light well because light leaked between the fibers. Møller Hansen was the first to recognize why. Total internal reflection confines light in a glass fiber only if the material surrounding the fiber has a refractive index lower than that of glass. That's no problem as long as the fiber is suspended in air, but the fibers in a bundle touch each other, so light can leak from one glass fiber into the next, blurring the image.

More importantly, Møller Hansen saw that he could solve the problem by covering the glass fiber with a material with a lower refractive index *(see Figure 3)*. He thought the index should be much lower than glass, and there aren't many such materials. He tried some oils, and found that margarine worked the best. He knew it wasn't a practical coating, but it demonstrated the principle well enough that he applied for a patent, and started telling reporters about his new idea. Danish papers wrote up his story, and a wire-service story made the *Los Angeles Times* on June 11, 1951.[5] However, that was the high point of his fiber-optic career; the Danish Patent Office rejected his application after finding Hansell's patent. Unable to convince any companies to support his work, Møller Hansen went on to other ideas.

An eminent Dutch optical physicist in his early 50s had a similar idea at about the same time as Møller Hansen. Abraham van Heel decided that flexible bundles of transparent fibers could be used in periscopes for Dutch submarines. Van Heel also discovered that light leakage was a problem, but he didn't find the solution himself. When he asked for help, the Dutch government pointed him to an eminent American optics specialist, Brian O'Brien. In October 1951, O'Brien took one look and told van Heel to coat the fibers with something having a lower refractive index than glass. Van Heel mentally kicked himself for not thinking of something that in retrospect should have been obvious, and went back to Holland to experiment with claddings.

At about the same time van Heel spoke to O'Brien, a British physician arrived at a London dinner party after performing a rather distressing gastroscopy. When Harold H. Hopkins said he specialized in optics, the physician asked if Hopkins could design a better instrument. Hopkins pondered the matter a while, then with the help of a student named Narinder Kapany, Hopkins also made a fiber-optic bundle, although he didn't clad the fibers. At the start of 1954, Hopkins and van Heel published separate papers in the widely read journal *Nature*, and others started thinking about the idea.

That was not the whole story, of course. Van Heel's fibers weren't very transparent, even when he clad them with the best materials he could find—beeswax and instrument lacquer. Neither were Hopkins' fibers. But they were good enough to set a young gastroenterologist named Basil Hirschowitz to dreaming. At the University of Michigan, he enlisted the help of optics specialist "Pete" Peters. Peters—who initially didn't consider the project particularly challenging—recruited a sophomore physics major named Larry Curtiss who had been asking questions about medical instruments.

The project grew much more interesting when the first bundles did not work as expected. Coating fibers with plastic or instrument lacquer made little improvement. Nor did drawing the fibers from rods of glass with higher than normal refractive index. Curtiss eventually suggested that they clad their fibers with glass by melting a tube of glass with low refractive index onto the high-index rod, then stretching it out into a fiber. The physics professors

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

scoffed, but one December day when they were away at a meeting, Curtiss bought some tubes of soft glass at the chemistry supply office so he could try it. He melted a tube onto a rod, melted the tip in a furnace, and walked down the hall stretching a fiber behind him. "I was 40 feet down the hall and I could still see the glow of the furnace. I knew it was good," he told me.

The physics professors had no further objections. In a couple of months, Curtiss, Peters, and Hirschowitz completed the first fiber-optic gastroscope. Hirschowitz tested it on his first patient in February 1957, 30 years after C. W. Hansell wrote up his invention for the RCA patent office. The rest, as they say, was history.

What Took 30 Years?

Why did it take 30 years to go from idea to usable fiber-optic gastroscope?

The central idea of light-guiding by total internal reflection was well known in the 1920s, part of the standard tool kit of engineering ideas. Swiss physicist Daniel Colladon and French physicist Jacques Babinet first described it in 1842. Light-guiding water jets entertained crowds at the great Victorian exhibitions of the 1880s and 1890s; cloth woven from glass fibers sparkled inside. By the 1920s, bent glass rods illuminated microscope slides. One of the first uses for Lucite, the clear plastic invented in the 1930s, was in bent rods used as dental illuminators. It was a logical step to consider image transmission.

Cladding the fiber to confine light was not an obvious concept, but it was eminently logical. Van Heel was annoyed that he had failed to think of it.

Nor can you blame inadequate technological infrastructure. Optical glass was a well-developed technology in 1930. The furnaces might not have been as good as they were in the 1950s, but no essential equipment was unavailable. Anyone with the right idea could have slipped a rod into a tube and drawn a glass-clad fiber like Curtiss's back in 1930s.

You can't blame a lack of money. The whole Michigan project cost about $5500 over two years, and nearly $4000 of that went to pay Curtiss. The little team scrounged other supplies and equipment from the university. That was more than Lamm or Møller Hansen had available—over a year's salary for a senior engineer at the time—but far from beyond the means of even a modest would-be entrepreneur.

Bad luck may have contributed. The Depression brought hard times, the Nazis made Lamm a refugee, and World War II preoccupied engineers for years. Those bad years stalled some other technologies. Yet without good luck, development could have taken years longer. Curtiss happened to have rods that were flame-polished, giving them the smooth surface essential for good fibers. At the time, most rods were polished mechanically, a technique that does not produce good fibers.

The real problem was the inability to assemble a critical mass of energy, resources, and ideas. Much as we would like to see a basement inventor score a dramatic breakthrough, that is the stuff of science fiction, not of technological reality. Working alone, Lamm and Møller Hansen could not put all the pieces together. Hansell had more resources, but he had other priorities. Van Heel and Hopkins stalled after they demonstrated the concept of image transmission. Van Heel's military funding ran out. Hopkins could not convince companies to pay for work on a commercial instrument. Corporate managers, he complained, were "dead from the neck up." That problem was not confined to Britain. Even Hirschowitz, with a usable model in hand, had to search hard before he found a company willing to invest in manufacturing instruments.

What made the problem more difficult was that imaging bundles fell be-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tween the boundaries of traditional disciplines. Optical engineers worked with lenses, electrical engineers worked with electrical and electronic devices, materials scientists made blocks of glass, physicians treated patients. Imaging bundles remain a separate chapter in optics textbooks, if they're covered at all. Fiber-optic imaging is a classic example of an interdisciplinary field, a little-explored area where potential breakthroughs can hide out of sight because you don't know what to look for.

Look at those problems, and you can understand how fiber optic imaging sat ignored for a quarter century. The necessary technology was available, and the need for gastroscopes was there, but the necessary ideas and resources were never assembled. Fiber-optic imaging could have happened many years earlier.

The Communications Breakthrough

The story is different for communications. You need far clearer glass to send signals kilometers than you do to peer a meter or two into the stomach. You need a compact light source that you can modulate very fast. Those things did not exist in 1932 when Norman French filed his patent application. Radio and copper wires were better choices then.

Only after demonstration of the first laser in 1960 did engineers start looking seriously at optical communications. At first they dismissed optical fibers because the best glasses weren't clear enough. Fiber which absorbs 20% of light per meter suffices for medicine, but you need light to go 100 or 1000 times further for communications.

A little group at Standard Telecommunication Laboratories in England took a different view, considering fiber optics as optical analogs of larger flexible plastic microwave waveguides. Their calculations showed that optical fibers were promising, if they could be made clear enough. A young Chinese-born engineer, Charles Kao, then took an important new step. While others asked how clear the existing best glass was, Kao asked instead what was the fundamental limit on glass transmission. Glass experts admitted they were not sure, but suggested impurities caused most absorption, so glass made of pure silica should be extremely transparent.

Kao and George Hockham admitted glass transparency was a big "if" in 1966, when they proposed developing fiber-optic communication systems. When other engineers scoffed, Kao made exacting measurements which proved that fused silica, an extremely pure synthetic glass made by burning pure silicon tetrachloride in an oxygen flame, was as transparent as he said it should be. Others began to take notice.

Bob Maurer had already begun working on fused silica fibers at the Corning Glass Works. Others avoided fused silica because of its high melting point, but Corning had worked with fused silica before, and Maurer, Don Keck, and Peter Schultz pressed ahead to overcome serious problems. In 1970, they drew the first optical fiber that met Kao's target; two years later, they made a much better fiber, which absorbed only 60% of the light passing through a one-kilometer length. By the late 1970s, Corning and others had fibers so pure that a one-kilometer length absorbed just a few percent of the light passing through it. Those fibers contained just parts per billion of impurities, and launched the rapid advance of fiber optic communications.

You could not have made those ultrapure fibers in 1955. The makers of communication fibers needed more advanced technology to start with. They soon started building their own infrastructure, and pushing the state of the art in materials science to make better fibers. Where it took five tries to get fiber-optic imaging off the ground, communications worked on the first try.

Why the difference? Charles Kao was a major reason; he saw, he believed, and he pushed the idea with evangelical zeal

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

for five years. Key managers at STL and at British Post Office Research Laboratories (now British Telecom Laboratories) deserve credit, because they bet their research budgets that he was right. Another reason was that the time was ripe. The telecommunications industry needed a new transmission medium because it was running out of radio spectrum, and that need was large enough to justify healthy research budgets. Initially, most of the money went to other communications technologies, but in the 1970s, fiber optics blew its competitors away. In addition, laser transmitters and other necessary technologies were advancing apace with communication fiber optics.

It didn't have to be that way. Fiber communications could have taken years longer to develop had Kao not argued his case as well, had key managers not had open minds, or had Corning not taken advantage of its expertise with fused silica. The stakes were high enough that delays would not have been as long as for fiber-optic imaging. The telephone industry needed bigger communication pipelines, and the technologies competing with fiber optics soon floundered. By the mid-1970s, fiber-optic communications was on a roll, and it was the right technology at the right time when competing long-distance companies started building national networks in the early 1980s. It's been going strong ever since. ■

Acknowledgment

This article is based on material to be published in *City of Light: The Story of Fiber Optics*, by Jeff Hecht, (Oxford University Press, Spring 1999), part of the Alfred P. Sloan Foundation Technology Series.

About the Author

Jeff Hecht is a correspondent for the British weekly *New Scientist*, and the author of several books, including *City of Light* and *Understanding Fiber Optics* (Prentice-Hall, fall 1998). His science fiction has appeared most recently in *Analog*, *Interzone*, and *Odyssey*. "The Rumor of the Ruined City" will appear in the April 1999 *Asimov's*.

References

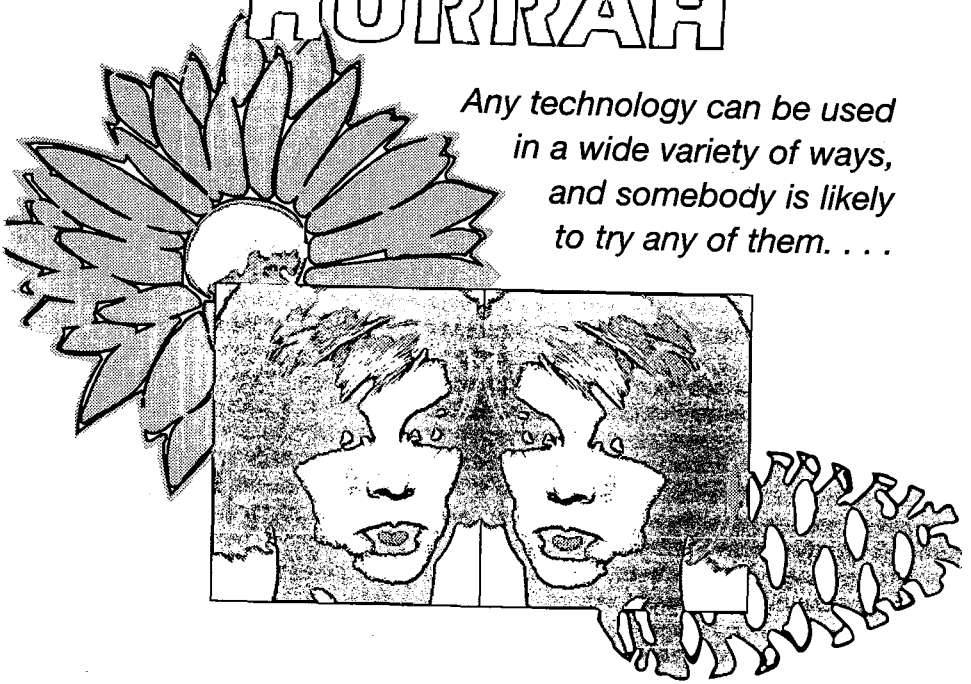
1. Clarence W. Hansell, notebook, in Special Collection archives at State University of New York in Stony Brook.
2. Unnamed source, quoted by Harold H. Hopkins, in "Optics in clinical medicine," presidential address, physics and mathematics section, British Association meeting, September 1977
3. Heinrich Lamm, "Biegsame optische Geräte," ("Flexible optical instruments"), Zeitschrift für Instrumentenkunde Vol. 50 pp. 579-581, 1930, translated by Lamm many years later.
4. Norman R. French, "Optical Telephone System," US Patent 1,981,999, application August 20, 1932, issued November 27, 1934.
5. Møller Hansen has a large file of clippings from the Danish press about his work, but the Los Angeles Times story is convincing evidence in itself. He mentioned the cladding layer in his patent application, but the Danish Patent Office did not recognize its novelty.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Kristine Kathryn Rusch

FLOWERS AND THE LAST HURRAH

Any technology can be used in a wide variety of ways, and somebody is likely to try any of them. . . .



It's amazing how life can change in the space of a day, an hour, a minute. That's a fact of my business. *Gossip Hourly* specializes in change—sometimes even initiates it.

But I didn't expect the changes that came after Detective Frank Forino's last official visit to my office. When he barged in, I thought the entire interaction was going to be routine.

He came through the doors unannounced—somehow he scared my receptionist—carrying a palmtop as thin as a piece of paper, and before I could decide whether I wanted to greet him or throw him out, he thrust the tiny screen at me.

"Looks like one of yours," he said.

Now that statement could have meant anything. My entire office was screens, except for the computers on and in my desk, the desk itself, and my chair. Plants dripped off every other surface, although I rarely paid them any attention. Some old guy with tattoos and piercing scars changed them every week.

But I knew Frank wasn't talking about the screen. He was talking about the pix on it. He usually brought me a pix, com-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

bined with some accusation or another. I usually lied, ignored him, or sent him to my lawyer.

I dropped Frank's palmtop on my desk, kicked my chair back and put my feet up, nearly slamming the screen with my right heel. Frank winced at me. He was a big guy with florid features, and they could make a wince twice as effective. I ignored him too. I laced my hands behind my head and leaned back.

"You gonna answer me, Colin?" To his credit, Frank hadn't tried to get me to move my feet or to take the pix back. Half the cops in the city would have. But Frank and I had an understanding.

"Why should I?" I asked.

"Because, idiot," he said. "This ain't no trademark tampering case. Not this time."

I glanced back at him. His face was red and the collar of his blue shirt was damp with sweat. His brown eyes had something unusual in them, so unusual I couldn't read them.

"Is it more serious?" I asked.

"You bet your ass," he said.

"Then I'm not answering any questions, officer. Not without my lawyer."

"Colin, you and me, we go back a long way," Frank said.

"I know," I said, "and that line has never gotten me anywhere with you, not even when I was reporting. Why should it get you something?"

"Because," he said. "This might be a you-scratch-mine, I'll-scratch-yours-kinda deal."

"Off the record?" I asked.

"No can do," he said. "Strictly by the book."

"I don't do strictly by the book," I said.

"You might want to this time," he said. "Take a look at that shot."

This was how it started. First Frank would get me to look at the pix. Then he'd get me to comment on it. Then he'd get me to admit that one or more of the parties involved was not who we purported them to be.

At least, that's what he tried to do. It hadn't worked yet.

I sighed and brought my feet off the desk. "I'm not going to confirm or deny anything," I said, as I reached for the 'top. Then my hand stopped inches above it.

It wasn't, as I expected, a download off our website. *Gossip Hourly* never published a pix like this, no matter what the case. We did murders, sure, and grisly ones. But we made it a point to avoid the more explicit shots, especially after the New York State Legislature made it a crime to publish visuals that might hamper murder investigations.

"Well?" Frank asked.

He was speaking to fill the silence. I knew that. Frank always did. He wasn't long on patience, but for all his bad grammar, he was long on smarts.

I had to play it just right.

I slid the 'top closer. The pix was a standard morgue shot, grim, yes, but also of little interest to our subscribers, who expect a bit more creativity from our two-D stills. The woman involved was laid out on the metal medical table, arms at her side, the Y autopsy incision scarring what had once been a very beautiful torso. The pix was taken by someone who had been crouching by her feet. They showed recent signs of hard use: five burst blisters and an ingrown nail on the left big toe.

"We don't take pix this dull, Frank," I said.

"It ain't the pix, nimrod," he said. "The pix clearly ain't yours. It's the body. The body's yours."

I was about to protest that the body wasn't mine, and then comment that it was a good thing too because otherwise Frank and I wouldn't be having this scintillating conversation, when I realized what he really meant.

The woman had a small number embedded in the arch of her right foot.

Frank was on to something; she could have been one of ours after all.

"OK," I said, wondering if even say-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ing this much was a bad idea without my lawyer. My stomach churned, and I envisioned a new ulcer. I'd just paid off the bill for capping last year's. "I see the mark. She's a flower, Frank. It's not my fault she's dead."

"We'll talk the ethics of flowers later," he said. "She didn't die of no Accelerated Age Syndrome. She was murdered."

"Why would anyone murder a flower?" I asked. "She'd be dead in a few weeks anyway."

"Now you're thinking," Frank said. "She one of yours?"

I almost snapped that I couldn't tell, not from the angle of that shot, and then I caught myself. To admit that would be to admit we financed the making of flowers, and admitting that would make us the victims of potentially damaging trademark infringement suits not to mention criminal charges if someone could link our operation with flower-making.

"We have nothing to do with flowers, Frank," I said in my prissiest voice.

"Yeah, right," he said. "And I got nothing to do with the criminal element in the Big Apple."

"Your sarcasm needs work," I said.

"So does your honesty," Frank snapped. "I'm coming to you for help on this one."

I shoved the 'top back at him. "You never said that."

"I said scratch-your-back—"

"But not help. Not the let's-do-this-entirely-off-the-record kind. You wanted by the book."

"You know something then?"

I didn't. But I could. It was only a matter of a few calls. "No."

"Ah, jeez, Colin. I already been to every pimp in Manhattan. You and them, you're the only one what uses this kinda flower."

I threaded my fingers together and rested my chin on them. "You don't read your nets, do you, Frank? Flowers are used in all sorts of industries, from medicine to fashion. I resent the fact that you try to lump us with the shady underbelly of New York Society—"

"When you'd rather be lumped with the doctors and models," he said.

Caught me. I smiled. "I was talking about two different issues here, Frank. The first was on flowers. The second was the other part of your sentence. The one where you said that only pimps and tabloids use flowers."

"I didn't say that," he said, taking the pix as if I didn't deserve to look at it any more.

"What did you say, then?" I asked.

"I said 'that kinda flower'. You both used that kinda flower."

"What kind is that?"

"That kind," he said, pointing at the screen so hard I thought his finger would poke a hole in it. "The kind that looks like somebody else."

"All clones look like someone else, Frank. That's why they're clones."

"But not somebody that famous," he said. "Medical researchers don't need 'em famous, and the fashion industry, well, they don't like getting sued."

Neither did we, but it was part of the business. I snatched the 'top from him again.

"She doesn't look like anyone to me," I said.

"Naw," he said. "Only Shardeen."

Shardeen, the biggest Christian superstar of the twenties. She was drop-dead gorgeous with chocolate skin, upswept blue eyes, and a figure on her six-foot frame that made every man believe there is a God. She sang on pay-for-play downloads, had her own vids, and starred in wholesome VR programs designed by her Christian backer. She and her husband, Davis Drew, the head of Mogul Media Productions (and a former alcoholic who claimed he knocked off the bad habits when he heard a voice from heaven) had a picture-perfect marriage that, rumor had it, was as deep as the picture and not quite as wide. We'd been trying to nail that relationship for years, and hadn't had a chance. Shard-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

een and Davis were more media savvy than the media, if that was possible.

I looked at the pix again. The hair didn't matter: Shardeen changed hers weekly, but the eyes were the right shade of blue and the skin was Shardeen's creamy brown.

"I don't see any resemblance," I said, and tossed the 'top back at him.

"Don't play me for dumb, Colin," he said. "It'll blow up on you."

"I'm not playing you for anything, Frank," I said. "We have nothing to do with this, although you could give us an exclusive for the 2:20 Celebrity site update."

"By the book?" he asked.

By the book in this instance meant that we could report the death, by murder, of a female Jane Doe, mixed ancestry, unknown type. New York had dozens of those every day. They weren't worth the pixels.

"What'd she die of?" I asked.

"You gonna run the story?"

"When it becomes one, which isn't right now. I'm asking for me, Frank. I'm curious."

"Curious about a Jane Doe?" He smiled. "She was poisoned, Colin."

Now he really had my interest and he knew it. That smile was smug. He watched as I sat up, as I punched the button which made my desk computer rise from the glass top.

"Can I get a copy of the autopsy report?" I asked.

"Thought you'd never ask," he said. "Access two-six-seven, use the usual voice code. That should get you in. It's the eighteenth Jane Doe for June twentieth."

"Thanks," I said.

"Don't mention it." He headed for the door. Then he stopped. "I mean it. Don't mention it."

"I won't," I said and waited until he left before adding, "at least, not yet."

The death of a flower wasn't news. Flowers died all the time. It was their nature. Flowers were illegal, but useful, as they had been since the teens. Cloning was easy, cheap, and fast—one cell could generate a dozen copies. The cloners grew the copies to the right age—taking care of the high-maintenance early years.

Medical researchers discovered the flower technique the way most things get discovered—while they were looking for something else. As they made clones, an illegal practice anyway, they tampered with genes. Tamper with one area on one clone to see how it affected the body; tamper on another area with a different clone from the same cell to monitor another effect. Eventually, the researchers discovered how to accelerate the aging process, which accelerated the experiment process, and of course, some enterprising researchers saw the possibility for side money, using the rapidly aging clones. No one would miss them, the researchers thought, and they could generate a lot of quick cash—which they did. An entire black market industry in flowers grew up almost as fast as the flowers themselves.

Some of the lesser tabloids still doctored pictures, but that was riskier than flower work. Every time a new technique made doctored photos "perfect," someone discovered a way to find the flaws. Over the last twenty years, the law stopped protecting our rights to publish what we wanted. Now we had to prove that the story was "true to the best of our knowledge." Flowers enabled us to do that because no one could tell flowers from the real person—at least, not without removing their shoes.

For our purposes at *Gossip Hourly*, the best flowers stayed fresh for about three weeks. That actually meant a seven week life-span, with two weeks growth, three weeks of use, and two weeks of deterioration expense, which we usually got some of the less reputable medical labs to cover.

Flowers died all the time.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

No one cared. Few humans considered lives of such a short duration important. Sure there were the Save the Flowers freaks, and the sincere ethical folks who were constantly testifying before Congress trying to get laws passed to legalize and regulate flower-making, but they weren't having any success.

Flowers never lived long enough to vote.

Besides, flowers were human, despite their life-spans and origins. Once made, they were covered under the same laws as the rest of us. If a flower was murdered, and they were more often than you'd think, the perps rarely got prosecuted—rarely got caught. It was only the most flagrant cases that made headlines, and the most disgusting operations that got shut down. When the kiddie porn folks got into flowers, the cops swooped in. When the fringe VR producers based their product on flower snuff, the cops swooped again. But the rest of us got harassed sometimes, got sniffed sometimes, but otherwise we didn't get bothered.

We gave flowers work, kept them off the streets, and paid for their upkeep during their brief sojourn on this earth. It really wasn't that expensive. We rarely had the same flower on the payroll for more than a month.

So flowers died. At the hands of inept researchers or in random shootings or in crimes of passion, usually committed by an overzealous john.

But flowers weren't poisoned. Poison suggested a deliberate killing. A premeditated death. A *reason* for taking an already shortened life.

So that was the essence of the you-scratch-my-back-I'll-scratch-yours case. Frank knew I wouldn't be able to let this one alone. The puzzle was too great.

If I could get official word on this, we'd be on-line with it in a matter of hours, and the story would hang for days.

Maybe weeks.

* * *

I didn't download immediately after Frank left, although he expected me to. I had other business first.

I left my office and wandered into Celebrity Headquarters. CHQ leader Jacques DuFriesne was running audio on the latest lead while he was fact-checking another story on screen. I noted as I approached his desk that he had a split screen working, one with his notes, and one which instantly reported the notes of his favorite source.

I put a hand on his narrow shoulder.

"Sorry to interrupt, Jacques," I said. "It's important."

"It better be," he said. "I'm supposed to upload in fifteen."

Each section of *Gossip Hourly* had its specific upload time. Celebrity uploaded at twenty after, City uploaded at twenty-one after, and so on, with our display changing every minute of every hour of every day. The tabloid really should have been named *Gossip Minutely*, but that didn't have the right ring to it. So we settled for *Hourly*. A person could instant download every hour, and have a new tab in front of him. Publishing like this took diligence, it took coordination, and it took minds like DuFriesne, who could do three things at once, and still consider himself slacking off.

"Prepare someone else to do the upload," I said. "I'm not sure how long this'll take."

"I'm working on a delicate piece," he said.

"It'll have to wait an hour, then."

"We'll get scooped by the *Globe*."

I shrugged.

"It's your neck," he said and beckoned his assistant, one Gerda Hockstader, to his desk. Gerda was slender and blonde and had more implants than a Major League Ball Player. He showed her what he was doing, and pushed away from his desk.

"OK, what?" Jacques asked as he stood. I beckoned him out of Celebrity and into the hallway between. I wrapped a casual arm around his shoul-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

der as if I were chastising him for something. It was an old habit of mine, and it guaranteed that the curious would leave us alone.

"You do a flower for that piece on Shardeen?"

"Yeah," he said, "but the first deployment was a complete failure. I was planning a second, but never got around to it."

"Why not?" I didn't like hearing that he had wasted company funds on a failed story.

I felt his shoulders stiffen beneath my hand. "I lost the flower."

"You lost it?"

He shrugged and looked away.

Flowers did get lost sometimes. They were left to themselves a lot, and even though they had neural implants, the implants were not a great substitute for real learning and experience. It was rather like having a three-year-old child with the body of an adult, the intelligence of a dog, and more useless knowledge than the *Encyclopedia Britannica*. Anything could go wrong—and often did.

"Who was babysitting it?"

"Gerda," he said. "But she got called out on assignment."

Gerda. The one he'd left in charge. The one he said I'd regret.

"Get her," I said.

"Someone's got to do the update," he said. "These things can be delicate. We don't dare miss a detail."

Sometimes he forgot that I worked my way up through the ranks. "What's the story?"

"The President's Lesbian Love Affair."

"I thought the *Star* did that this morning."

"They did," he said, "but not with footage."

"Is ours real or is it flower-footage?"

He looked hurt. "Does it matter?"

Of course it did. It mattered, and I needed to know. I just stared at him.

He sighed. "We don't have a flower for the president."

"I know," I said. We had an evergreen, developed rapidly enough for use at the end of the election, but with a life-span of a good dozen years. Evergreens were used only for people with staying power; presidents, Elvis, and the occasional superstar.

"Why would any president allow someone to film her having sex?"

"Stevens did in '08."

"You sure?" he asked.

"It was pre rapid-growth cloning techniques," I said.

"And no one has allowed it since. They all remember the scandal."

So our video was flower-footage. Once, just once, I would have liked our stories to have more than verisimilitude. I would have liked them to be real. But in this flower-heavy world, I no longer knew how to make real interesting.

"Sir?" he asked, in a tone that suggested he had said the word before. "You want me to get Gerda?"

"Yeah. Send her to my office." I let go of his shoulder, and let him return to Celebrity. The place would be complete chaos in there for the next ten minutes. They did have an update to finish. The moments before a deadline were always hectic.

It was a good thing they had fifty minutes in between. They could use the time cleaning up the stories they did manage to get.

I went back to my office, my mind spinning. A dead flower, a failed story, and a lot of money out of my company's pocket.

I didn't like how this was shaping up.

Flower creation was a lot more delicate than it initially sounded. A man, a company, couldn't just order up any old flower. He needed a cell, some DNA, something that would regenerate. And then he had to find someone who would make the flower, no questions asked.

Since flowers were illegal anyway, the questions weren't asked. But no one

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

wanted to get caught. And the folks most likely to get caught were the ones in charge of famous faces. Under my tenure, *Gossip Hourly* had suffered weekly investigations, and nearly thirty-five trademark infringement lawsuits, all of which we had won. None of the celebrities who claimed we had misused their trademarked image—pix, vids, holograms and VR representations of their famous faces, bodies and voices—could prove we were responsible for the flower. They couldn't even prove that we had known the difference between the flower and the celebrity.

We had a good team of lawyers but they weren't the only ones responsible for our excellent luck in defending our publication. We kept our activities as separate from the flower makers' as we could. So far, Frank and his minions had proven inept at data-base robbing or easy encryption decoding. They also lacked the manpower, and I hoped it would stay that way, because we had to keep track of expenses and inventory.

Everybody did.

And that could create problems in the wrong hands.

When Gerda Hockstader had arrived in my office, she had already been prepared. She wafted in on a wave of *Charlie* so thick, it made me think of my great-grandmother. Gerda's implants made her cheeks a bit too red, her eyes a bit too large, and her body so out of proportion that I wondered if she'd topple forward onto my desk.

"I didn't lose her intentional," she said, smacking on a piece of gum, and sitting, uninvited, in the cracked leather chair beside my desk.

"I would hope not," I said, trying to remember if I had approved this woman's hire or if the approval had come directly from personnel. I wondered who had interviewed her, and whether it had bothered that person that this Gerda Hockstader preferred to speak in ungrammatical English.

A tabloid had to have some standards.

"Why don't you tell me what happened?" I asked.

"I ain't gonna lose my job, am I?" She peered at me sideways with those buggy eyes. I assumed that she assumed that the look was seductive.

It wasn't. It was creepy.

And I wasn't going to answer her question. "Ms. Hockstader, I called you into my office to ask about the flower you lost, not to discuss your employment."

Although we would discuss her employment if I decided that she lost the flower through her own complete ineptitude.

"Well, it wasn't my fault," she said, and I suppressed a sigh. With her type, it never was. "They didn't have no apartment for her, you know? Sports was supposed to give up Apartment A, but they still had some soccer guy in there. Good news for the real one, they said, because in person years, he'da been about a hundred-thirty years old. They were trying to farm the soccer flower off to some Aging Research Institute, but they claimed they already had too many flowers of this guy, and they didn't need no more."

I remembered the problem. The soccer player's clone had tied up the apartment for an extra two weeks. We had sixteen apartments that usually went from flower to flower. Sometimes an apartment or two stood empty, but rarely did we have none empty at all. And never before had we had one tied up by a flower who seemed to be morphing into an evergreen.

"Go on," I said, when it became clear we were getting to the heart of the story, and she didn't want to incriminate herself.

"So she's supposed to stay with me," Gerda said. And there it was. The center. "I gave her the code, even implanted it in that neural thing, and gave her instructions on how to find the place, and told her when to meet me."

"What went wrong?" I asked.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"If I knew, we wouldn't be missing one flower, now would we?" she snapped.

"She didn't show?" I asked.

"How'm I supposed ta know?"

"You were supposed to meet her," I said, none too gently.

She shrugged. "Deadlines."

"I'm sure you've shepherded flowers around deadlines," I said, beginning to really dislike this woman. I would call up her personnel file the moment she left.

"I have," she said. "But this was an *evolving* deadline."

The staff hated evolving deadlines, and for some reason, they blamed me for them. I suppose they had a point, since I was the one who mandated that only two people cover any one story. But usually stories popped and fizzled within six hours. Every now and then we had stories that lasted for days, and the two in charge of it had to learn to work in shifts of twelve hours each. The first day of this marathon usually caused an all-nighter, and that, in turn, created animosity towards me.

My staff hated to go without sleep.

They should have had my job.

And my annual ulcer.

"So that was Day One of your evolving deadline. And you couldn't contact her? Warn her?"

"A flower?" Gerda asked. "Like I'm supposed to have her e-mail address? This babe wouldn't have known an e-mail message from a voice from God."

"She was dumb?"

"She didn't know ta wait for me, now did she?"

"I don't think that's prima facie evidence, Ms. Hockstader."

She blinked at me. I had used the phrase on purpose. All of my staffers should know a few specialized terms and "prima facie" in connection with "evidence" was one of them.

"I don't see how that's the issue," she said archly, obviously not clear at all on what I had just said.

"Oh?" I asked. "The issue is what, then?"

"Why this company don't have no policy for lost flowers."

"We're not even supposed to have flowers, Ms. Hockstader. How could we have a policy dealing with them? I thought this was explained to you when you were placed on Jacques's team."

"I signed a few papers."

"Did you read them?"

She shrugged. "That was six months ago. Four thousand three hundred hours ago, you know?"

"Actually," I said, "it was four thousand three hundred eighty hours ago, if we're going to be exact."

"You like lording stuff over people, don't ya?"

I guess I did. It was one of the reasons I'd been promoted. "It's my job to know how many hours there are in a day, a week, a month, or a year, Ms. Hockstader. We say that's how many issues we put out, even though that's not technically true. Technically, we put out a new issue every minute, which would mean that you signed those papers two hundred sixty-two thousand eight hundred issues ago. By my lights."

"As if you read all those issues."

"I read every story we put in *Gossip Hourly*, Ms. Hockstader," I said. I wasn't quite sure why she was irritating me. Probably because she was subtly complaining about her workload, when all she had to do was concentrate on one story, sometimes for days. I had to concentrate on as many as one thousand four hundred forty stories per day plus the business of employee management, the *Hourly's* financing, and making certain we had site space. I also had to handle cops and flowers and other nefarious aspects of running this business.

She complained about an occasional all-nighter; I was lucky to get sleep. And people wondered why folks in my profession burn out after a few years. There's nothing left.

"So what is the policy?" she asked and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I nearly groaned aloud. If she didn't know, then other employees didn't know either, and we were in deep trouble. Before I fired her, I'd better make certain she signed the confidentiality agreement, and that she understood that she had signed it, and that everything she owned was forfeit if she failed to live up to it.

"It doesn't matter," I lied. "When did you start looking for the flower?"

"I didn't," she said. "I forgot until Jacques reminded me."

"And when was that?"

She had the grace to flush. For a few moments there I thought she had no conscience at all. "When he told me you wanted to see me."

I bit my tongue to keep from firing her then and there. Confidentiality. Frank. Flowers, and whatever else she might know. Those were all reasons to keep her on staff until I could shut her up.

Now I knew why all those Mafiosi from the past century killed people who knew too much.

It was easier.

I made myself smile. "Thank you, Ms. Hockstader."

"That's all?" she asked.

"That's all," I said.

"Really?"

"Did you expect something else?"

She stood slowly. "I kinda thought you might, you know, be a bit upset at me or something."

I shrugged, half amazed that she was buying this entire routine of mine. But then, Frank bought it damn near every week.

"Why should I be upset at you, Ms. Hockstader? After all, she was just a flower."

Just a flower.

Special ordered through one of our holding companies, bought and paid for through another, and lost by an inept Celebrity writer who hadn't even had the decency to mention it the following day.

If Frank got his hands on this one, there'd be no bargaining.

Someone had murdered the flower because we had been careless. I tried to console myself with the idea that she would have died anyway, but it didn't wash.

Something about the poison.

It meant that someone had had time to consider killing her.

And that someone knew how to find her.

I contacted personnel and had them look up all the paperwork in Hockstader's file. Then I used the access number Frank had given me and called up the code. Then I asked for the eighteenth Jane Doe file for the twentieth day of the month.

The autopsy appeared on my screen. The file number was in the high six figures. They had realized she was a flower, and gave her case the lowest priority possible.

Made me wonder why Frank was even investigating it, even in a I'll-scratch-your-back, you-scratch-mine, by-the-book fashion.

Something nagged at me about that.

I skipped the part about the poison. I would come back to that later. What I wanted to find out was where the flower died.

I scrolled through a mountain of information in the space of a minute. My reporter's skills hadn't left me. In the old days, I could pull the good pieces out of an autopsy in thirty-five seconds flat, and be accurate.

They found the flower in Trump's Last Hurrah.

Actually, the name of the building was the Gold Building, and it was crown jewel in Trump New York. It was in the middle of some behind-the-scenes power jockeying, had been since the Donald died, at the very ripe old age of eighty-five. The Gold Building had just been under construction then, but the Donald had said, in one of his last an-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

nouncements, that it would be the building everyone would remember him by, and the name Trump's Last Hurrah had stuck ever since.

A mere flower couldn't afford the Hurrah. Hell, the editor and business manager of a tabloid couldn't afford it either. Was her assignation at the Hurrah? That wouldn't make sense. If we needed a Hurrah-like setting, we usually used the Set, a series of interiors that looked like New York hotels. Our pix people were good at avoiding things like the missing wall or the lack of a ceiling.

But the Hurrah was an interesting case in point because it redecorated on such a regular basis that we couldn't always be certain our Hurrah room looked like the real thing. We used the Hurrah only for special—and important—cases: presidents, heads of states, the occasional superstar puff piece. We rarely used it for a case that had the chance of being an evolving story. We didn't want to risk getting the setting wrong.

And we never paid for a room at the Hurrah.

Ever.

Not even for undercover (no pun intended) work.

The Hurrah was like the State Department: it kept track of whoever breathed its air, let alone rented its rooms. Of course we did have a mole in Hurrah reservations. We knew who was staying there and who wasn't. We never got that detail wrong if some lawyer wanted to fact-check us.

How did a flower get from a new reporter's dive apartment to the Hurrah? And how did she manage to stay long enough to die there?

To be *poisoned* there.

I scrolled back to the beginning of the autopsy report. I hadn't misread the case number. It was still way too high to merit Frank's attention.

But something had brought it to his notice.

The use of the Hurrah?

And why would that scratch my back?

Was something going on in my offices that I didn't know about?

Of course. There was always something going on in an employer's office that he didn't know about. But was it something I should care about? I didn't know. And that was the question I needed answered.

I nearly paged Frank, then changed my mind.

I had a better idea.

New Yorkers never drop in on each other. This has been a fact since the dawn of time. Or maybe longer. Maybe the Native American tribe that once owned Manhattan never knocked on each other's teepee doors. I don't know.

All I know was that to drop in on someone was so déclassé I'd never heard of anyone doing it.

Not only was it unusual, it was also dangerous. A man could get shot doing something like that.

It was also a sign of desperation.

I was not desperate, but I wanted Frank to think I was. It was my turn to visit his turf, and to throw him off balance.

Now, granted, I didn't have to work on any of this. I could have walked away from this whole thing at any moment. But somewhere in the afternoon, between my discussion with Jacques and the dismissal of Gerda from my office, this whole thing had become personal.

And it wasn't, as you might think, about the flower.

I'm going to be honest and crass here because it's necessary. You might misunderstand, think my motives on this whole case were honorable, think that I had, in the space of an afternoon, had a complete and total change of heart.

I didn't.

I don't think anyone had a complete change of heart, although some of us had a change of business practices. It wasn't about the flowers. Not really. For

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

no matter what we tell you, no matter how much lip service we pay, we don't see flowers as human.

How can anything be really and truly human and only live a few weeks? I ask you, if you had only lived between March and April of this year, would you be the person you are now? Would your life be worthwhile? Would it be worth saving?

Of course not.

Now, sometimes I did use flowers to destroy perfectly innocent lives, and those are the stories that still haunt me. Like the case of the soccer player and the latest operatic diva—you know who I mean. The rumors were hot, they were heavy, and they were wrong. The marriage was happy—had been, that is, until the pix of our floral soccer player clone with that no-name flower in one of our VR sets became the greatest scandal of all time.

I'd had no idea that the diva would swallow so many pills, or that the primitive stomach pumping techniques still in use in the greater New York area hospitals could ruin a larynx.

I had no idea at all.

Not that ignorance is an excuse.

Heads rolled after that one, and I was a lot more careful about which targets we went after on flower-like stories.

Like Shardeen.

Shardeen was a prime target. She paraded herself as a great Christian lady with a heart of gold, but she was no Christian and she had no heart.

We just couldn't prove it. For every story we heard, we couldn't get anyone to talk on the record. Her husband controlled too many jobs, in a wide variety of businesses. And he seemed to believe all that crap he and Shardeen prattled about their fairy tale relationship.

Even though I knew she had her eye on other men. She'd even had her eye on me for a nanosecond. But I didn't go for Christian hypocrites. When I approved the Shardeen flower, I had done it with her husband in mind. No man needed to be made a fool of in quite that way.

All of this is a roundabout way of explaining why I left the rag in the capable hands of Debora, my assistant who lusted, equally capably, after my job, and ventured into the wilds of Brooklyn, a place where no one of my status and reputation went any more.

I went because, for the first time in nearly a decade of covering illicit affairs and trying to scandalize an occasional head of state, Frank had surprised me. Intrigued me. Made me feel like a cub again.

I hadn't felt like a cub in a very long time.

I had been a good reporter then. Back in my cubbing days, there were still opportunities for good reporters, although folks who really cared about news and reporting it were being replaced with folks who were a lot more interested in being reported, or who wanted to make their names as scandal-mongers or commentators. I wasn't vapid enough to comment, and I really didn't care who was sleeping with whom.

I just wanted to have an effect on something.

I had a few minor successes. A few changed policies at some of the local precincts. A major story on the mayor. A few kids taken off the streets and given good homes.

But I was part of a dying breed, and I realized it long before the first flower came on the scene. I even covered the flower development story, and I remember worrying, even then, about the potential to exploit flowers. I never saw how the changes in my own industry would lead me to do it—not because it was cheaper up front, but because it was cheaper (and easier) in the long run.

In those early days, I thought of flowers as human.

I don't any longer.

Brooklyn hasn't changed a lot in the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

last hundred years. Parts of it have, of course—neighborhoods have gentrified, then shifted back to genteel poverty again, and many have regentrified. But a lot of the houses are still made of brownstone, and they have nice lots with yards, and they still have trees out front and the sound of children's voices in the early evening, the feel of a neighborhood—the kind where everyone knows everyone else.

It wasn't my set. My set lived in westside high-rises and aspired to Park Avenue and Central Park. But sometimes I longed for this. I had just never managed to maintain a relationship, and these neighborhoods whispered family, something I was beginning to believe I would never have.

Frank's house was in the middle of the block, as brownstone as the others around it. Nothing to distinguish it, nothing to say a guy I'd known for nearly twenty years lived inside. The roots of an old tree pushed up the sidewalk, and the tree itself provided shade for three yards. The house had a front porch that looked like it'd been glassed in during the smog crisis of the early 00s, and the inside door, which was obviously from the same period, was made of steel. Otherwise the house hadn't been touched since it'd been built.

I wondered if Frank's family had lived there for generations.

Probably.

Housing in the Greater New York area was at such a premium that a cop, on a cop's salary, couldn't have afforded a dive apartment, let alone a place like this.

My weight on the porch stairs triggered the house security system. Bolts and steel cables slammed home behind all the windows, and a small red light blinked above the old-fashioned doorbell, the kind that went out of use when I was a kid.

"Hey, Frankie," I said in the direction of the light. "It's Colin. I decided my back needed scratching after all."

The light flicked off for a second which meant someone inside was checking my vitals, then all the bolts and locks and cables slid back. The porch door unlocked and slid open by itself. As I stepped inside, Frank pulled open the steel interior door.

"Didn'ja know you could get shot doing this?" he asked.

I shrugged. "I thought you lived in a safe neighborhood."

"You're lucky I do." He stood aside and let me into the dark interior. It smelled of old cabbage and fresh spaghetti sauce. The wood on the floors was warped and wavy. A staircase curved to my right. To my left was a large living room complete with two net chairs, a VR station, and a flat screen rolled up and hidden in one of those mural tubes near the ceiling. Pictures hung on every available wall, and some were as old as the house.

I was right; Frank had inherited the place.

He led me into the kitchen. A boy with Frank's features stirred two pots on the stove. A raw-boned woman with graying hair sat at the table, grading school assignments with a palm scan. She was Frank's mother. His wife, he explained, hadn't made it home yet. She worked luxury taxi in the City, and she was working extra hours because there was a big to-do at the Met and she wanted the cash.

I never gave other people's financial situations much thought, but I realized that even with the house, and the land, and the three-paycheck household, Frank's situation was tight.

Money was never something I worried about. Time was what I worried about.

Strange to see how things differed from person to person.

He led me to a small shop in the back. It had been built in the middle of the previous century and it still smelled like oil. Only Frank had converted it to his office away from home. A tiny space

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

heater gleamed on the wall, but in the summer months like these, only good old-fashioned windows provided any relief at all. He had computer equipment still stamped with the department's name on the side, and he had a lot of other gee-gaws, most for processing evidence. He obviously did a lot of work here, which didn't surprise me, given the cramped and uncomfortable conditions at his precinct.

He scooted a folding chair toward me, and pulled toward him a square-backed wooden chair that would have been an antique if it weren't for the layers of spray paint. The folding chair was like one my grandmother had; the metal was thick and old, and the chair squealed when I sat on it.

"So what's so urgent you had to risk life and limb to come down here?" he asked.

"Your case," I said.

"You got something?"

"Maybe," I said. "First I want to know why you're investigating this. Because she died in the Hurrah?"

A smile played at his lips. "You read the autopsy."

"Of course I did."

"Then you saw it was one of them designer poisons, working over several days."

I hadn't really noted that. I had just noted the name, and I hadn't recognized it. I had planned to look it up later.

The case got curiouser and curiouser.

"That," I said. "But I was wondering whose room she was in. It didn't say on the report. It just gave the room number."

"I thought you had some mole in reservations."

"I do," I said. "But I really didn't want to use him on something like this."

Frank's eyebrows went up. "It's a him?"

"It was last week." I grinned. "Might be different this week."

"Some day you're gonna tell me," he said.

"Some day you're going to put me out of business," I said.

He laughed. Then he sobered up. "If I tell you this, we're in that you-scratch-my-back-I'll-scratch-yours situation."

"Off the record," I said. "We're not reporting this story."

"You will once I tell you."

"Maybe not."

"Don't make promises you can't keep."

I sighed. "Look, either we do it by the book or we don't. But if we do, we go nowhere because you and I can't talk. Why don't we pretend that we're partners this time?"

"And why is that?" he asked. "You know something?"

"Maybe," I said.

He shook his head. "All right. I don't say nothing about where I get information, and you don't report nothing until I say."

"And if you happen to learn something about another operation, say, or a piece of information that could possibly be harmful to, say, a company as a sideline in this investigation, you don't prosecute."

Frank held up his hands. "I don't make those kinda deals. You know that. The DA'd be all over me."

"You make those deals all the time," I said. "That's how you get information. It's a time-honored tradition among cops."

He sighed. "Yeah, but not with guys like you."

I stood. The folding chair groaned again. "I guess I came down here for nothing, then."

"Colin," he said, and I heard pleading in his voice.

I froze. "What do you need me for?"

"The flower." His voice was soft, regretful. "What I come to you for in the first place."

"Do we have a deal?" I asked.

"If upstairs finds out, it'll be my butt."

I shrugged, grabbed the handle on the hot metal door.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"All right," he said. "I ain't heard nothing, especially from you. You been as uncooperative as usual."

I nodded and returned to my chair.

He was staring at me. "My info says your guys ordered up the flower, and then lost her."

"Celebrity," I said, feeling the hair on the back of my neck prickle. I'd never admitted to anyone outside *Gossip Hourly* that we made flowers.

"Good," he said. Then more softly, he repeated, "Good."

"Why?" I asked.

He looked up, folded his hands as if he were imparting the most important information in the world, and said, "Because the room belonged to Davis Drew."

The implications were staggering. No wonder Frank was trying to cover his ass on this one.

Davis Drew, media mogul and Shardeen's husband, shared a room with the flower. She died of a slow-acting poison. Did he do it, thinking she was Shardeen? Thinking the designer poison was slight enough that no one would know that she'd been murdered?

Or did he knowingly kill the flower? And if so why? As a warning to *Gossip Hourly*, and other publications/programs/VR vids like us? Or to warn Shardeen that this would happen to her?

Or was there something else involved? Something I didn't see?

"Davis Drew wouldn't be that stupid," I said, trying to remain calm even though my brain was racing.

"That was my first thought," Frank said. "So I figured maybe the poison was for him. But why was he shacked up with the flower? Why not his wife?"

We were always good about reporting stories that could be true, especially when we used flowers. We were going to get pix of Shardeen with a lover in a New York hotel, because she was supposed to be at a New York hotel.

With Davis?

I'd have to check, but probably.

So was he shacking up with the flower, thinking she was Shardeen?

How could anyone mistake a flower for a real person?

Unless their relationship was based on something other than conversation.

That thought made me shudder.

"Don't add up, do it?" Frank said.

"No, it doesn't," I said. And Frank was right; the flower was the key. It gave him an edge knowing that Drew didn't order up the flower himself, or that someone else didn't send it in, as an exact duplicate, coached in the art of being Shardeen.

Our flowers just had to look good in the pix. They didn't have to talk right or pretend to have the same experiences. Our flower was as obvious a clone as they come.

"You talk to Drew yet?" I asked.

"No," Frank said. "His people keep tying us up with red tape."

"Cut through it," I said. "I'll work as your partner on this. You handle the official parts. I'll trace the flower."

He grabbed my arm. "I can trust you on this?"

"If you couldn't, you shouldn't have brought me into it."

"You know what could happen, don't you?"

I knew a million things could happen. I didn't know which one Frank was focusing on. "What?"

"This could bring down the whole *Gossip Hourly* flower business. You and your competitors, when this blows, could become villains."

I smiled at him. Frank was a good cop, but he didn't understand spin. "I doubt that, my friend," I said.

He shook his head. "Don't say I didn't warn you."

"All right," I said. "I won't."

There were too many players, I thought as I reached my office. I got off the elevator to find the normal chaos: a

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

screaming fight in Sports because someone forgot to double-check information for the lead story in the hourly update; a process server, sitting beside the fern bed in the lobby, obviously waiting for someone he didn't recognize and of course the receptionist was giving him no help; a glitch in our daily subscription charge—we were charging viewers last year's day rate instead of this year's; and so on.

My life: one crisis after another.

I let the fight in Sports settle itself. I ignored the process server and he ignored me—so somehow I failed to meet the description he had. And I put a big notice on the front of this hour's magazine, claiming that the day rate was artificially lowered as an "unannounced special" for today only. By midnight, we would be back to the normal rate, and someone in subscriptions encoding would be unemployed.

All of this I managed before going to my inner sanctum. There I closed the door, locked it, and booted up the other computer, the one Frank didn't know about. The one no one knew about except me, the installer (now employed at company offices in Sydney) and my boss who probably has forgotten the seven codes it takes simply to get the computer out of the secret drawer in the desk.

I sat in my leather chair, used the linen handkerchief that came with the suit to wipe the sweat off my face, and wished I had asked the secretary to order me a frappaccino. Old-fashioned, I know, but I had developed a taste for them as a boy on hot summer days, and when I was sweating this bad, nothing seemed to satisfy my thirst better.

Instead, I opened my mini-fridge, took out my last allotment of bottled water for the day, and downed it. The frappaccino would have to wait.

I called up the ordering service for flowers—not that ordering flowers was ordinarily my job, but I did double-check the invoices, particularly after we'd been double-billed for the presidential evergreen. The service was listed under a gardening company that did supply the office with all its green and blooming plants. Frank checked that one years ago, along with everything else in our data files, and found nothing suspicious. That was because the boss initially paid the service a hefty cash fee to duplicate their invoice system. Our flowers had numbers, all right, but they matched numbers on the growing plants that filled the offices. The only difference was a dash in the flower system that wasn't there in the gardening service system. The gardening service kept a copy of its invoice and so did we, only we assigned those numbers to flowers.

The billing went through another broker, and was infinitely more complicated.

I pulled Frank's downloaded pix off my desk and peered at the number. Then I entered it in the item slot on my computer, and waited. The download was slow throughout this system because we decided not to use state-of-the-art. State-of the art encryption systems always had bugs, and we couldn't afford to have any. So in the heartbeat I was forced to wait, my stomach churned.

I hoped the flower wasn't ours.

I worried that it was.

I wondered what I would do if it wasn't, since I'd already confessed to Frank about our flower service. Halfway through the download, I worried that Frank had killed the flower himself just to catch me at all the trademark violations.

He wouldn't have done that, would he?

Not Frank. We were old pals. He would have warned me first. Besides, I was small fish compared with the others he chased. And he preferred a homicide investigation to all others.

Then the number appeared on the screen, and my stomach churned even more. The flower *was* ours. Ours, and lost, and turning up dead in a hotel room rented by Davis Drew.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

It just didn't add up. If Drew wanted to murder his wife, why not do it in their home? Or hire someone?

Or why didn't he simply divorce her? It would ruin her reputation, not his. He could go back to being a multi-media mogul with no soul, and she would have to explain how her religion failed them both.

I shut down that program and opened the indoctrination program. The flower had been given a standard chip, and had been set on minimal communication. She couldn't even have registered at the Hurrah by herself.

Finally, I called up the security tape of Gerda giving the flower instructions on finding the apartment. It was, as Gerda said, standard. And the flower had nodded as if she understood.

She had been an amazingly good likeness of Shardeen. Aged to perfection, clothing exact, even the nail polish its garish combination of purple, green and gold spangles. Someone had found her a rip-off gold cross, the kind that little Catholic girls used to wear after their confirmation, and that Shardeen still wore in the hollow of her neck, and the masquerade was perfect.

As long as the flower didn't open her mouth.

I reopened the pix. No gold cross, no nail polish. The cross could have been removed, along with the clothing. I would have to check.

I let the computer disappear into its hiding place, and reset the security protocol. Then I swiveled my chair, and used the regular computer to view the autopsy once more. The flower had been brought in wearing a linen pantsuit, no make-up, and no shoes.

Curiouser and curiouser.

I leaned back in my chair. There were too many players. That thought kept coming back to me. If Davis Drew murdered his wife, he would lose everything. If he murdered a flower to make a point, he would still lose everything. Flowers were considered human under the law, but it took something extreme to prosecute a flower case.

This was extreme.

And even if he'd done it to make a point about the tabloids' use of flowers, he was being silly. He owned more tabloids than any other mogul outside of England. He had to have his own flower business, fully funded and with the same silly rules as ours.

Flowers.

Frank was right. The key was in flowers, but I wasn't sure yet how.

Flowers, and the last Hurrah.

I had some suspicions, things I knew Frank wouldn't think of. He never cross-checked cases, especially if there wasn't a body involved. He also wouldn't check when Shardeen was due in New York, and he'd try to ask Drew himself what kind of relationship he had with his wife.

I knew Drew'd lie. Hell, if I were married to Shardeen, I'd lie. But facts rarely did. Real facts, the kind a good data person could uncover.

I sent e-mail to Research, requesting three pieces of information: how many people, if any, got stomach flu at the Hurrah the week that the flower died; how many appearances Shardeen made that same week; and when was the last time Davis Drew spent some quality time with his wife.

I told them I wanted the answers within ten minutes.

I got them within five.

Davis Drew never spent quality time with his wife. They didn't even live in the same house. Theirs, it seemed, was a perfect marriage on the surface with some unusual gaps underneath. They appeared in public together, yes; they had children together, yes; and they gave interviews filled with anecdotes about their undying love, yes.

But.

No one else remembered the incidents portrayed in the anecdotes. No one ever saw them together outside the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

public eye. No pix of the happy couple at home or on some nude beach or frolicking contentedly with the kids.

In fact, the kids had a house—and presumably a nanny—all their own.

Heads were going to roll in Celebrity. This was better than some concocted story about a flower Shardeen and a lover in some hotel room. This was *real*.

Although convincing the non-tabloid press of that would be really, really interesting. Sometimes we paid, big-time, for our so-called reporting techniques.

As to the second question, Research flagged its own findings. The return e-mail said:

Here's what we got, boss. Double- and triple-checked. Still seems strange. Got to be a glitch in the system somewhere. We'll see if we can find it.

And then they gave me a list of Shardeen's personal appearances in the week the flower died:

One hundred church services all on a single Sunday morning, all in small rural churches without much attendant publicity; twenty-nine special church appearances throughout the week, usually in the evening; a five-day recording session at her Nashville studios; a concert in Central Park; and a religious revival, done as a favor for Rufus G. Falwell, whose family had been in the revival business for more than sixty years. No one snubbed the Reverend Rufus G.

Along with the listing were the dates, times and places. Only the really public events did not conflict with anything. The night of the religious revival, Shardeen had nothing else scheduled, and the same with the afternoon in Central Park.

I printed out the figures. I wanted them in my hand.

I didn't like what I was thinking.

If there was anything I knew, it was flowers. They could be programmed with a shtick, just like anything else. If they were supposed to be part of a pix, they would get one kind of programming. If they were supposed to sing, and repeat a few words from the Bible, they could do that too. Evergreens especially could learn a particular program and stick with it.

I sent a question back to Research before turning to their third answer to my original e-mail. *Does Shardeen get paid an appearance fee?*

Then I opened the third piece of e-mail.

Seventeen personal physicians made house calls at the Hurrah in the last two weeks of the flower's life; two dozen conference attendees got food poisoning after the banquet supper; and three penthouse clients were hospitalized with severe stomach ailments. Research had more numbers, but the rest were speculation. These forty-four incidents were directly tied to the Hurrah.

Someone had been putting designer poison in the food that came out of the Hurrah's kitchens. It wasn't in the e-mail, but it was obvious.

I printed up that letter too.

Then I paged Frank, my stomach jumping with excitement. He answered immediately—or rather one of his junior officers did, saying Frank was nearly done with Davis Drew and would come to my office when he finished.

I hoped Frank had as good a session as I did.

My computer pinged.

Research had sent the last piece of information.

And I felt like a reporter again.

When Frank arrived, I was redoing *Gossip Hourly's* budget. I was using figures from the real budget and the hidden budget so that I could get the work done. Money that went into flower production and storage; evergreen production and storage; reporter's fees; research; web space; overhead. The amounts were staggering, and the subscriptions had leveled. About five years ago, the folks who logged on every day,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

every hour, remained about the same. Sure we got the occasional blip from the spectacular story, but we got fewer and fewer of those.

We needed a change.

I was about to break into *The Star's* monthly budget report when my door opened and Frank came in unannounced. He closed the door behind him. His color was up, his eyes were too bright. He was annoyed.

"Davis Drew had fifteen lawyers who all disagreed," he snapped before I could ask a single question. "They spent the entire meeting arguing about whether Drew could talk on the record, then ended the whole thing after I had him state his name and occupation."

"Got another meeting set up?" I asked, knowing I was playing with fire.

"Of course, and if they try this horseshit again, I'm gonna to get all fifteen of them lawyers for hampering a police investigation."

"Can you do that?"

"I sure as hell can try."

I suppressed a smile. One thing I had learned in all the years of my business: avoid people as sources as much as possible.

"Well, I did have some luck," I said. I waved a hand expansively. "Sit down."

Frank did, with a grunt and a moan. The man needed a vacation. Hell, I needed a vacation, although I wouldn't know what to do with one.

"I got three separate things for you," I said, "and I want your permission to let us break the stories."

"Fine," he said. "When the time comes."

"When the time comes," I said. Then I did smile. "And I want you to give *Gossip Hourly* credit for helping you solve the case."

His eyes narrowed. "Only if I can talk about your flower practices too."

"You'll open us up for lawsuits," I said, no longer worried about them. Amazing how a half hour can change your life.

"You'll get enough profit to cover the losses," he said.

"Deal," I said.

He narrowed his eyes. He knew I'd capitulated too easily. Slowly he folded his beefy hands over his chest. "You ain't exactly ingratiating yourself to me. I had a hard day."

I nodded. "First, the Hurrah. There's been some trouble in the old Trump empire, hasn't there? Some jockeying for position?"

"Rumors of some stock manipulation scheme," Frank said. "Something about devaluing the company so it can get bought out."

"And the crown jewel of Trump New York is?"

"The Hurrah," Frank said.

I slipped him the hard copy, the one with all the illness numbers.

He stared at it for a moment. "Where'd you get this?"

"Our guys in Research know how to use a computer." I didn't tell him that we had access, legal and illegal, to nearly every database in the country, and a good half of the developed world.

"No longer looks like a flower murder, does it?" I said.

"Yeah, but you'd think Drew's people would know this," Frank mumbled. "He probably had a touch of the poison himself."

"But he was hiding something else," I said. I slipped him the second hard copy.

"Is this a joke?" he said, looking at Shardeen's appearances.

I shook my head. "And she gets paid a fee for each one."

"Flowers," he whispered.

"Manufactured, I'll wager, by Davis Drew's own flower-making enterprise."

"How'd you know he's got one?" Frank asked.

"What made you think we do?" I countered.

He grinned. A wide, toothy look that was the reason I liked him even though we'd been at odds for a long, long time. "You're quick."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"And Drew likes to make a buck."

"So there's no Shardeen?"

"Don't go daffy on me now, Frank," I said. "Flowers are *clones*. There has to be a Shardeen. And you'll know where she was if you look at that schedule closely enough."

He peered at it. "Recording studio session."

"Right," I said. "Plus the concert in the park, plus Rufus G's revival."

"Everyone else got a flower."

"Yup."

Frank frowned at me. "I still don't get it," he said. "If he had flowers, he knew what one was. He didn't need to bring your flower to his room."

I leaned back in my chair, and put my feet on the desk. Frank's face grew redder. "Think about it, Frank. Our flower was lost."

"And Drew thought she was one of his? Ain't there no way to check that sorta thing?"

I wasn't going to answer that, not for all the companionship in the world. "Flowers are illegal, Frank. Would someone like Drew leave a trail?"

"Guess not," Frank said, but he sounded unconvinced. Hell, I was unconvinced on that part. The only thing I could figure was that Drew brought the flower back to his room so that he could check her number, and get her off the street before someone found her. When he realized that her number wasn't one of his, then he had to figure out what to do with her.

By then, she was probably quite ill from eating the poison in room service food, and he didn't dare take her to a hospital.

Frank was mulling over the information. Three separate incidences that formed one case. He shook his head, and stood. "Gotta hand it to you," he said. "If this stuff checks out, you're one brilliant guy. We'd never have found this on our own."

I put my hands behind my head, waiting.

"And a deal's a deal," Frank said. "I want some time to double-check this stuff, but go ahead and break the stories. Be prepared for flak and lawsuits on your flowers."

I smiled. "I'm prepared."

He shook his head. "You're one strange guy, Colin."

I shrugged. "I know," I said.

Everyone remembers the stories. The poisoning at the Hurrah, which resulted in hundreds of arrests, from the execs who masterminded the plan to the kitchen staff who carried it out. Arrests, lawsuits, famous people, and the closing of a hotel—it would have been enough right there, but it wasn't.

We published the story on the death of the flower, complete with autopsy report and morgue pix. Our researchers found Drew's flower facility (which, thankfully, wasn't ours) and the ensuing uproar was even better than we'd hoped. The Christian community treated Shardeen like a devil, numbers of related ministries toppled, and cries of hypocrisy filled the land.

Some of those cries, of course, were directed at us. But we managed to put a nice spin on the flower story, showing how well we treated ours, and vowing not to use flowers ever again.

And we don't use flowers. At least, not technically. We have a few evergreens—it's tough to get any kind of pix of the president these days—but now we rely mostly on reported stories. I had to let the bulk of my staff go, the Gerdas and Jacques of the world, people who could write and manage three screens of info at one time, but who couldn't think and make the kind of connections I made.

Now research runs *Gossip Hourly*. We've bulked up our staff with folks who know how to investigate databases, how to ferret out information, how to read autopsy reports in seconds, and we're the hottest publication to hit since the turn of the century when the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

first vocal, vid, and written mag downloaded in less than six seconds. The articles we've been running still fit the new legal standard—they are "true to the best of our knowledge." Subscriptions are up, and so are profits now that we no longer have much of our cash tied up on flower support.

It's the best situation I could hope for all around.

And flowers. Those changes were long in coming, and of course, *Gossip Hourly* takes much of the credit, however undeserved. The Senate Hearings are nearly done, and it's becoming clearer that the regulations on cloning will become more stringent. Enforcement and prosecution will go up. Of course, the black flower market will merely get more clever, but that's a story for the future. Right now, we have waaay too much current stuff to report.

Like the use of flowers by celebrities for appearance fees, fan stroking, and other strange activities. Like the way politicians can fundraise all over their home state, and never leave their estates.

When we got hit with our first trademark violation suit related to the use of celebrity flowers in the aftermath of this case, our attorney used my argument: how do we know who violated the trademark? The flower existed. Maybe it was even created by the celebrity. There is no proof that *Gossip Hourly* created the clones or even knew that the flower was a clone at all.

We didn't even have to pay court costs in that case. I doubt we'll have to pay them in any of the pending cases either.

And me, I haven't had to go in for ulcer capping at all this year. The doc says the changes I've made in my lifestyle agree with me. I guess. It's more fun reporting the news than it is making it up. And more creative too. What people really do with their lives is a hell of a lot more unbelievable than anything we could invent.

Our rising subscription base proves it.

Maybe someday I'll even assign someone to stories of flower exploitation. It'd have to be an idealistic cub, someone who didn't know about *Gossip Hourly's* flower history. And I'd have to figure out what to do with the evergreens, something I'm not willing to do yet.

The only downside about all of this is that I don't see Frank much. He became famous during the resolution of the Davis Drew flower murder, and he spends a lot of his time dodging the press. With all the changes in trademark infringement, and our decreased use of flowers, he has nothing to harass me with.

He'll come up with something, I'm sure. As soon as the press lays off him.

Kinda nice to have the tables turned for once. Real nice, actually. Especially since I didn't need a flower to do it.

Amazing how life can change in the space of a day, an hour, a minute.

You'd think I'd know that, given the business I'm in.

But every now and then, I have to learn the lesson again.■

CUSTOMER SERVICE OR SUBSCRIBER ASSISTANCE

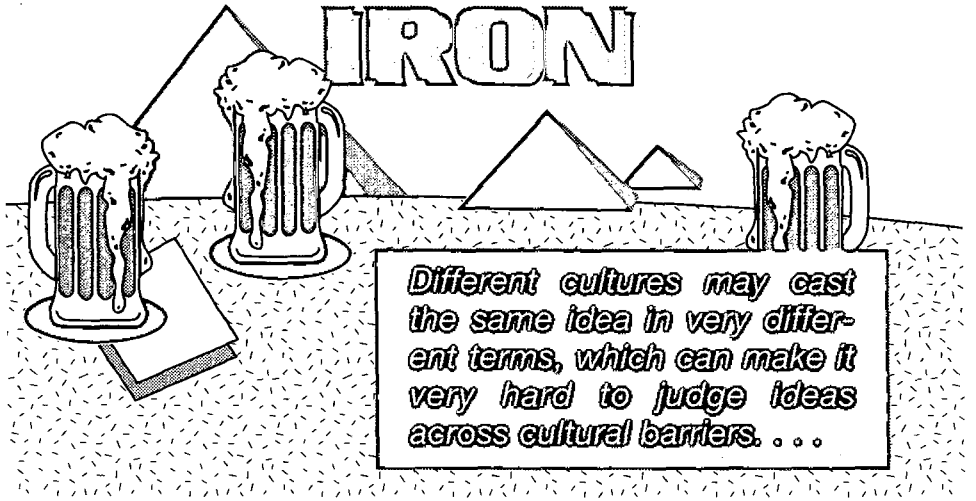
Please direct all changes of address and subscription questions to:

ANALOG SCIENCE FICTION AND FACT
P.O. BOX 54625
BOULDER, CO 80322-4027

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Michael F. Flynn

FLAME OF IRON



Different cultures may cast the same idea in very different terms, which can make it very hard to judge ideas across cultural barriers. . . .

Sure, hate and vengeance were the last things on my mind when The O Neil and I walked into the Irish Pub that day. The milk of human kindness was in me; and shortly, the Guinness as well, which is much the same thing. Yet there are some who cannot let an ancient hurt die. And those who treasure it even, who nurture it in the gardens of their minds; and for whom that hate has become life itself, its iron flame providing the only glow they have to light their dim existence.

Tuesday being a quiet night and all, The O Neil and I had it in mind to shoot a couple of racks of pool. Yet, who should we find in command of the table when we arrive, but Jimmy Shaugnessy, the which has never been known to lose a game. There is no shot within the power of mortal man that he cannot sink—and not a few others beside—for all that the man is a paraplegic and confined to a wheelchair. Nonetheless, The O Neil placed his quarter upon the table rail, which by long custom put him in line to challenge. A gleam of anticipation lit his eye, and his mustache twitched like a caterpillar come alive. Not that he had any hope of winning the challenge; but it was a great honor to be whipped by the likes of Jimmy.

As for myself, I know which end of the cue hits the ball and only a little else beside. So, I took myself to the barroom and found a stool comfortable for the long sitting I saw ahead of me. O Daugherty Himself, short and barrel-chested, with his hair slicked down and parted in the middle, kept station behind the oval-shaped bar. A knowing man, he needed no prompting to set a mug of frothy Guinness before me.

There were not many others in the bar, Tuesday being a slow night as I have said; only a scattering of the old neighborhood and a few who had wandered over from the University. Doc Mooney slouched in his usual seat before the all-news channel on the TV, with a whiskey sour in his hand and a frown equally sour upon his face. Directly across from me, Wilson Cartwright, the history pro-

Illustration by Shirley Chan

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

fessor, was deep in conversation with a bone-thin, rumpled man, the beak nose of whom I recognized from the campus newspaper: Horace Ffyschespeare, the *sassenach* archeologist, come to the university to organize one of his famous Egyptian digs. The Nile had left its mark on the man, for he had the dried and sun-baked look of those who have been overlong under the tropic sun. A few stools from me, Maura Lafferty gazed dolefully into an empty mug. I beckoned to O Daugherty.

"Maura seems a bit cast down," I said when he had leaned over. In truth, the woman had the look of misery on her and I have never been one to leave the fair ones unconsoled.

O Daugherty wiped the bar before me and nodded his head. "It's nothing at all; only the lady's uncle has died."

"Ah, a terrible thing."

"Not so terrible as that," said Maura, who had overheard us. "Another black-and-tan, if you please, Mr. O Daugherty." She changed her stool for one beside my own. "The man was in pain," she said reseating herself, "and the death was a blessing to him. No, it's my father has me worried."

O Daugherty had gone to the taps. "Well I know the man. He has the years on him."

"No, I didn't mean that he was sick, too," she answered. "Only he never spoke to Uncle Francis in thirty years, and now his brother is dead."

"That is bad," O Daugherty acknowledged, "to die with things unfinished. A quarrel, was it?" He brought Maura her black-and-tan and set it before her: Guinness stout cut half-and-half with a lesser brew.

"A quarrel?" she said. "Why, when I was a girl, it was worth your supper and go to bed even to raise Uncle's name at the table. And none of us even know the cause of it, it is that far back. A silly thing, I'm sure. Some petty grudge that grew and fed on itself until it took on a life that was bigger than the both of them. All of the cousins took a hand trying to bring them back together; but all for naught. Uncle Francis, I think, would have liked to see his brother one last time, the death being on him. He was anxious to make his amends. But father would hear no such thing, and would not even set foot in the hospital."

Himself shook his head sadly. "Family quarrels are the cruelest. It is something the Irish have a talent for."

"My father had a quarrel," I said. "With the neighbor woman, and a fine quarrel, it was."

O Daugherty took up a glass and began to polish it. "How so?"

"When I was a tad, my brothers and my sister and I were playing stickball in the back yard, and Padraig knocked one over the fence into the neighbor's yard. Well, she wouldn't give it over, the neighbor woman wouldn't, and chased the dog after Padraig when he tried to climb the fence. Ah, that harridan! She had a basement full of confiscated balls, I'm sure, much pleasure may they have given her. So, my brothers and me, we went climbing into the attic and go to the window, and don't we take a pee all over her roof."

Maura wrinkled her nose. "I'm sure *that* squared the account."

"That it did not, Miss Lafferty. Mrs. Fitzgerald, for that was her name, came and pounded on our door and gave our parents a tongue-lashing for raising such delinquents, which only made them take our part. Though they gave us our own lashing afterward; and not with the tongue, mind you! So, didn't Da set his garbage out to the curb that night a little bit on her side of the pole, only to find them tipped over in the morning." I paused and took a sip of my Guinness. "It went on for years, waxing a little greater with time. There were phone calls and shoutings and a police visit or two. The surveyors came once because she called them to check the property line. And Da, he built a brick wall against her, though she had it torn

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

down because it blocked the sun from her garden. Fill it up again, Mr. O Daugherty, and for Maura, here, as well."

"And what came of it all in the end?" asked Maura.

"The woman died, as your uncle did, may they both rest in peace. It left an awful hole in Da's life. Planning his next revenge had become his hobby and with her gone, he was at a loss. I think that toward the end they had grown closer than most friends ever do."

Himself nodded wisely as he set our mugs before us. "Next to a good friend, a good enemy is the best thing."

"How long," said Maura, "do you suppose a quarrel has been kept. The longest one, I mean."

"Well . . ." O Daugherty cocked his head and looked thoughtful. "There was Mrs. Arokis around the corner and Mrs. Lopdorf who lived as her boarder at first. But I think your Da has them beat, Mickey."

"The Hatfields and the McCoys," Maura suggested. "How long did that go on?"

"Less than a generation," I told her. "A feud hardly worthy of the name. Did the O Flynns and the Mac Costellos not ambush each other for two hundred years back in the old country?"

"Oh, well," said O Daugherty. "There are no feuds go back longer than the Irish and the Foreigners."

Wilson Cartwright spoke from across the bar. "The quarrel between the Arabs and the Nubians has lasted since the twelfth century."

Himself cocked an eyebrow at him, not because the black man had been listening in to the conversation, for that is what one does in a barroom, but because the information was news to him. Himself was a great one for picking up odds and ends. "Is that a fact, now?"

"I couldn't help overhearing," said Cartwright apologetically. "Yes, another, please; and a gin and tonic for Horace." He leaned his beefy arms upon the bar. "Nubia is an old country," he said. "When the Juhayna Arabs finally broke through in 1276, she had been civilized for twenty-one centuries, Christian for seven, and fighting off the Arabs for six. By then, she had split in two: Dongala in the north and Soba in the south. Dongala fell quickly, but Soba held out for another two centuries before the Arabs finally destroyed it."

O Daugherty nodded. "A sad thing it is to lose a country, as any Irishman can attest. Your drink is on the house, then." He busied himself with the making of a bourbon and water. "So the struggle lasted eight hundred years, did it?"

Cartwright shook his head and accepted the free drink. "It hasn't ended yet, but they call it a 'Sudanese civil war' now." His smile was wry and not at all full of humor. "The Arabs still raid black towns in the south for prisoners to sell in the slave markets. *Slave markets*, in this day and age!" The look on his face had passed from humorless to outright anger.

"Ah, listen to the lot of you," said Doc Mooney suddenly from his seat before the television set. "Here I sit watching these Albanians and Serbs kill each other for no better reason than that they are Serbs and Albanians and you sit discussing the matter as if it were no more than who hit the most home runs."

Himself nodded toward the television. "I've always said that watching that thing does no good for a man's digestion."

The wizened archeologist with Cartwright spoke. There was a faint ring to his voice—Cockney, I thought. He had not always been a professor, and something rough stirred restlessly within his breast. "It's all beside the point, anyway. The young lady asked about personal quarrels, not ethnic struggles; and none of your examples lasted as long as—" He stopped suddenly and shook his head.

"As long as what?" asked Maura.

"Nothing." He waved a hand over his own drink and that of his companion.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Another round. And fill the other glasses, too." This was not as generous as it sounded, for only the five of us were present. Himself does not touch the creature while on duty. I thought for a moment of fetching The O Neil and Jimmy from the back room, but The O Neil was after taking four pitchers of draft with him, so I thought he'd not be needing more.

"I'll honor that request," says Himself, "but only if you'll tell us what the longest quarrel has been. You were about to say so, don't deny it."

The archeologist looked about the room. "It's a strange tale," he said doubtfully.

"Why, then, a perfect tale for a slow Tuesday night," Himself said. "No Irishman has ever let so poor a thing as plausibility spoil the telling of a fine story." He set the gin and tonic in front of the leathery old man, who reached out a hand, withdrew it, then finally grasped the stem of the glass.

"All right," he said, as if accepting the glass had been a contract. "It goes like this. . . ."

There is one land in Africa more ancient than Nubia, (said Ffyschespeare) and that is Egypt. Khem was already old when Babylon was young, and her pyramids had weathered for centuries before the first stone was ever laid in China's Great Wall. You think of Egypt as a single country, but in the beginning there were many small states, formed around local irrigation works. They fought one another over control of the water, conquered or were conquered, until finally only two remained: the Red Kingdom of the Bee in the Delta, and the White Kingdom of the Reed in the Valley. In the far south, the warrior hawk kings at Nekeb-Kekhen warded the border against the black men of Nubia—who were not then so civilized as later, begging your pardon, Wilson.

For two hundred years, Red House and White House vied for supremacy. The *bit* kings of the Delta built the White Wall against the *nesu* kings of the Valley. But, they had both forgotten the *hor* kings. Finally, a succession of mighty hawks came down from the southern highlands and made themselves masters, first of the Valley, then of the Delta. The Scorpion began the conquest and Nar-mer completed it, and his son, Men—who called himself *hor Aba*, "The Hawk Triumphant"—became the first king of a unified Egypt. He built his palace of Men-ofer on the very site of the old White Wall. Every two years, these pious kings celebrated the *Following Up After Hor*, to honor the hawk-god who had led them to their glorious victory.

Nar-mer took a Deltan princess, to seal on the couch what he had conquered on the field. Neithotep—ah, she was a beauty! Beside her, Valley women were rude country girls. So who was captor and who captive in that bedchamber is hard to say, even now.

When he passed on, Nar-mer had himself buried twice: symbolically at Abydos in the Valley, and physically at some unknown location in the Delta. All we have today of the Great Unifier is his glyph—a harpoon and a river catfish—and a stone palette depicting his triumph. Little enough, but that was a ruder age. An age of deeds, not words. The sophisticated world of Hebrew and Babylonian and Greek came a millennium and a half later.

But what these daring men won on the battlefield they lost in the nursery. Each succeeding Hawk took a Deltan bride; and so with each generation, the children, raised by their Deltan mothers, were seduced to Deltan gods and Deltan ways. When they stopped celebrating the Following Up, the people of the far south—pious, as country folk often are—rose up. Semerkhet, the Thoughtful Friend, raised the hawk standard at old Nekeb-Kekhen, retook the Delta, and founded a new Dynasty.

But his victory, too, proved tempo-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

rary. The Deltans formed secret societies, plotted in alleys and dark rooms, and bided their time. Finally, a weakling ascended the hawk throne—*hor* Sekhemib. "Strongheart." No *hor* ever bore a name less fitting. The Deltans struck, seized the White House and captured him.

Ffyschespeare swallowed the remainder of his gin-and-tonic in one convulsive gulp. "And do you know what that mewling, spineless *king* did?"

Now I had never heard of Strongheart or the Thoughtful Friend or any of that crew, but it was not to hard to see what the old man was leading up to. "Sure, he threw in with the rebels," I suggested. Himself nodded silent agreement.

Ffyschespeare's glass struck the bar like Judgment's hammer. "He more than 'threw in.' He *embraced* them. He changed his name and became *set* Peribsen, 'Hope of All Hearts,' and replaced the hawk on his *serekh* with the dog of Set. Supplanting the noble bird with a vile scavenger."

"After all this time," Himself said mildly, "it's not much to get worked up over."

Ffyschespeare gave us a look that almost froze my soul, so full of anger it was. And then, in an instant it was gone and he smiled ruefully. "Yes. Ancient warrior kings, who fought for incomprehensible causes five thousand years ago. But tell me this: When the year 7000 comes, if such a year ever does come, will anyone then know of Hitler or Churchill or Roosevelt or Stalin or care which were the heroes and which, the villains? No, their names will be as leeched of humanity as Hawk Triumphant or Thoughtful Friend or even All-hearts' Hope. Only names. Only names, and forgotten deeds." Ffyschespeare sighed and looked away.

Myself, I shivered. The Year 7000? Jesus, Mary and Joseph, that was a long time. And yet, the events Ffyschespeare had spent his life in untangling were no more distant. Somehow, the past always seems closer than the future; but when I thought about it, I realized that the Pyramids were older when Julius Caesar saw them than Julius Caesar would be if he were to walk into the Irish Pub and order a cold one.

Ffyschespeare looked up. Maybe the gin-and-tonic had gotten to him. Or maybe, once he had started talking, he was a hard man to stop, mistaking his own enthusiasms for the interest of others. There was no shortage of that sort among the Irish Pub's clientele. Why, Danny Mulloney could talk for hours about God, and that without any personal acquaintance on his part.

"It was Peribsen that started the quarrel, when he plundered the tombs of the hawks and burnt them out—Hawk Triumphant, Cobra, He Who Succors, Safeheart—all but one. The cries of the dead enraged Nar-Mer, who—"

"Now wait one minute," Doc Mooney said. "Sure, this Nar-mer must have been dead by then."

The archeologist nodded. "For three hundred and fifty years," he said.

Doc Mooney squinted down one eye and looked at the professor. "Well, then, he'd be past caring, now, don't you think?"

A frown creased Maura's brow. "The cries of the dead? I don't understand."

Ffyschespeare smiled a thin smile as dry as the desert sand. "Why, the dead *hor* kings, of course, young woman."

"Someone will explain this, soon, I'm thinking," O Daugherty said to no one in particular. "Or he may never receive another drink in this establishment."

Wilson Cartwright was frowning at his companion. "You must be referring to Egyptian funerary beliefs. The three souls?"

"Yes," said Ffyschespeare. "The three souls."

"Oh. Well," Himself said. "The three souls. That explains everything."

"Since I enjoy drinking here," Cartwright said, pushing his empty glass

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

forward, "I guess I better explain. Horace may wince a little, but I'll keep it simple. You see, the Egyptians made a great study of death and the afterlife—Now, Doc, let me finish. They believed that we each have three souls. The *akh* is the 'celestial soul' that lives with the gods in the Boat of a Million Years. The stars in the sky—those are the *akhu*. The *ka*, on the other hand, is the material soul. It remains with the body, and lasts as long as the body itself lasts. That was why the Egyptians took such pains to preserve their dead and supply them with grave goods. The models, paintings, statues and such helped the *ka* reminisce about his life."

"I don't suppose there is much else to do," Doc Mooney cackled, "lying about in a tomb."

Ffyschespeare's face hardened. "There was advice," he said. "To such of one's successor's as sought it."

Doc Mooney slapped a hand on the arm of his chair. "Do you mean to tell me that these dead kings would actually talk?"

Cartwright intervened. "That was where the *ba* came in. The *ba* is . . . well, the spiritual I/O module. It maintains the link between the *ka* and the *akh*, and can also appear to mortals. It's what we would call the 'ghost'."

Doc Mooney shook his head. "Give me Danny Mulloney's straightforward simplemindedness any day. Look," he said. "I know something about mummies. One of the things they did, was they turned the brain to oatmeal and sucked it out through the nose."

"A terrible thing," said I, "to find on your handkerchief after a good, hard sneeze."

Ffyschespeare shrugged. "You believe the seat of consciousness lies in the brain. The ancient Romans thought it was the liver. At other times, people thought it was the heart." He pointed to the television set Doc had been watching. "If you smash that thing, it no longer speaks or tells stories or responds to your inputs. But can you say that the programs or games or websites have 'died'? Suppose your brain is an antenna, a 'receiver' for a program you call a 'person.' A unique program narrowcast to a unique receiver."

"And what would be the 'transmitter' for these celestial power beams of yours?" Doc asked suspiciously.

Ffyschespeare spread his hands. "Who knows? Call it God, if you like. Or Brahma. Or . . ." This with a sly grin, "Aten."

Doc Mooney snorted. Over his shoulder, I saw the outside door open and a man enter clad in khaki bush clothing and a broad-brimmed hat. My first thought was that Indiana Jones had come to settle the argument; my next, that Indy had not aged well. The man was as wizened as Ffyschespeare, though his tan was lighter. Ffyschespeare would not look at him. The stranger grinned with most of his teeth and took a seat a little way apart.

"I take it Horace has been telling his tired old tales," he said.

Cartwright looked down the length of the bar. "Professor Hertzenhopf," he said in surprise. "What brings you to town?"

"I heard this old fool was organizing another of his futile expeditions." The newcomer's voice was high and nasal, almost like a Boston accent. "I came from morbid curiosity—to learn if the University would fund him." I saw how Ffyschespeare's hand tightened on his now-empty glass, and for a moment, I thought he might hurl the thing at the other man.

Himself wiped his hands on a bar rag. "I don't believe the rest of us have had the pleasure," he said.

"Seth Hertzenhopf," the man said. "Like Horace, here, I dig up ancient bones." A sudden grin. "Or, I try to."

Ffyschespeare untensed and waved a hand over his gin and tonic. O Daugherty took it for a refill. "Pay Seth no mind," Ffyschespeare said. "I'm accustomed to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

his japes." He turned and looked at the newcomer. "His own expeditions have come back empty-handed, as well."

"Oh," said Cartwright, "surely not. Both of you have fine reputations in Egyptology."

"But some expeditions matter more than others," Hertzenhopf said with a dry chuckle. "Isn't that right, Horace?"

"Yes," said Ffyschespeare, locking gazes. "Some do."

Hertzenhopf grinned and turned away. "A beer, barman, if you please. Anything on draft." When he had the tall Pilsener in front of him, he lifted it to eye level and considered it. "An ancient art," he said. "Did Horace tell you that the Egyptians invented beer? Or was he too worked up over his glorious hawk kings?"

"Beer," said Himself. "Now there was a useful invention. As old as the pyramids, you say?"

"Older." Hertzenhopf took a long swallow. "Uncarbonated and unrefrigerated, of course," he said as he set it down. "I don't suppose Horace told you the whole story."

Cartwright looked thoughtful. Ffyschespeare ignored the comment. Himself shrugged. "'Tis a slow night. It has room in it for more of the tale."

Hertzenhopf grunted. He studied his beer for a while longer, then glanced sideways at his colleague. "Unification," he said, "looked different from the other end of the spear."

Ffyschespeare snorted. "The hawks did nothing to the Delta that the bees had not been doing to themselves."

He was answered with a shrug. "That was before my time," Hertzenhopf said dryly. "But you can imagine the revulsion the Deltans felt at the uncouth strangers who had taken their country. Ill-mannered country oafs with no art and little music who came north to slay their men and belly with their women. Poking with spears of one sort or another was the limit of their talents; though even in the bedchamber, their crudity showed. The Deltans tried to educate their new masters, to plane their rough edges. It took centuries. But when they had come close to success, a new wave of oafs supplanted them . . . "

"That would be The Thoughtful Friend," said Himself.

"Yes. His inscriptions boast that the Nile flowed blood for many days. Did Horace tell you about that particular bit of thoughtfulness?"

Ffyschespeare turned and faced him. "Was that so much worse than what followed? The sacking of the tombs?"

"Retaliation, dear chap. And perhaps *set* Peribsen had grown bored with the crude, unsolicited advice of dead barbarians."

"Haven't we gotten off the track, here?" asked Maura plaintively. "Mr. Ffyschespeare was going to tell us what the longest-kept personal quarrel was."

Both Ffyschespeare and Hertzenhopf looked at her in solemn-eyed silence. It was the lighter man who spoke first. "Why, that between Nar-mer and Peribsen, to be sure."

Ffyschespeare spoke. "Nar-mer wanted his vengeance for the sacking of the tombs, when—" He fell silent a moment; then whispered, "When his own son, Men, vanished horribly in flames. Never to hear his voice again; never to be sure which of the cold, distant stars was his *akh*."

"While Peribsen," added Hertzenhopf in a lofty tone, "sought justice for the Delta against the barbarians who had brutalized his mother's people."

"Justice?" snapped the older man. "He Who Succors? Or Safeheart? What were their crimes? That they ruled well and wisely? Or only that they dared rule their so-called 'betters'? If . . . *set* Peribsen . . . has a quarrel, it lies with Semerkhet—or with Nar-mer."

Hertzenhopf smiled grimly. "The Thoughtful Friend's was the first tomb to burn," he told the rest of us. "And the torches were lit by the grandchildren of those with whose blood he had once tinctured the Nile."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Ffyschespeare scratched his nose and looked sly at his colleague. "Never found Nar-mer's tomb, though," he said with a chuckle.

Hertzenhopf shrugged. "Not for want of searching. It's as well-hidden as Peribsen's own."

Himself nodded. "Ah. Now I understand. Since their mummies are lying preserved somewhere, their *bas* continue the quarrel, trying to destroy each other's *ka*."

Doc Mooney threw up his hands. "A quarrel between two dead men, is it? And lasting five millennia? Do you take us for fools?"

Himself shook his head sadly. "Five thousand years is a terrible long time to be carrying a grudge." He folded his arms and looked sternly at the two archeologists. "Sure, how can there be fire to it any more? The flames of passion must have died to mere embers a long time ago, and the hate become nothing more than the memory of hate, become nothing more than habit."

"Flames?" said Hertzenhopf flatly. "Even iron burns. Rust is the flame of iron."

Doc Mooney broke the silence that followed with a chuckle, "And it may be all those two poor dead men have to *live* for." His chuckle grew. "Maybe they should *get a life*." His smile died as he saw no one laughed with him and an indignant look replaced it. And, sure, it was a wonderful thing that such a fine pun earned no suitable reward from the rest of us.

O Daugherty took himself to the sink, where he pulled out glasses, dried them, and hung them on the overhead rack. He spoke while he worked, though not to anyone in particular. "I'm also thinking it'd be a terrible lonely life, with no one but each other that shares the memories, and the two of them not on speaking terms. Why, there must have been great deeds done back then that are worth remembering. Soft nights and good beer. Beautiful women and brave men. And, aye, old enemies, too."

Silence greeted him. The television news had cycled around and once more Serbs and Albanians went at each other. "It's not so simple as all that," Ffyschespeare said at last. "It was hardly a trifle that started it. Not a ball in some neighbor's yard."

Himself shrugged. "That may be. Though I would think these two *ba* fellows would grow wonderfully weary of the whole thing. If five thousand years are not enough time to heal even such terrible wounds, why then what use would Eternity be?"

Maura let out a shuddering sigh. "Ah, if only my Da and Uncle had made their amends, they would not be thought such fools by their children."

Hertzenhopf looked at her thoughtfully for a long time. Then he pushed his glass forward and stood. "And if the 'children' have forgotten the very names, or even that there ever was such a quarrel? Do something long enough, you find you cannot stop. You mentioned 'habit,' barman. Imagine how ingrained a habit can become after so long a time." So saying, he rose from his stool and bid each of us farewell, saving only his colleague.

When Hertzenhopf had gone, Ffyschespeare took his leave as well. He had his expedition to plan. There were to be meetings in the morning. Sure, it was a wonder that a man could walk so steady when he was after pouring so much alcohol down the throat of him.

Himself called to him as his hand touched the door knob. "How can it matter," Himself asked, "after such a long time?"

Ffyschespeare turned and looked back. "When the hate is all that is left, it matters." Then, he, too, was gone.

Cartwright sighed as he turned back to face the bar. "Those two . . ." He shook his head with a rueful smile. "Understand, both are fine men, professionals. . . . Oh, Horace can be a bit rude and crude, sometimes; and Seth can come

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

on a bit snooty, but no one knows the Archaic Period better than they do. Still, a man can bury himself so deeply in his work that he begins to identify with his subject. Two fellows in the history department—nice guys, both—nearly came to blows last year over Lancaster and York. Horace and Seth, well . . . They've become partisans, too. It seems a little silly to an outsider, but their rivalry goes back a long way."

"Yes," said O Daugherty. "A very long way, I'm thinking."

"What did they mean," I asked, "when they twitted each other about failed expeditions?"

"Oh, that's part of the rivalry," said Cartwright. "Of course, most of their expeditions have been roaring successes. In fact, they both have such an uncanny knack at locating undisturbed sites, you'd think they already knew where these places were. But actually, they're very clever at using satellite photos and topographic studies to identify likely spots. I don't know how many mummies the two of them have unearthed and presented to museums. But, everyone needs a sort of Holy Grail to search for, some prize that, at least in his own mind, would be the capstone of a career. So Horace has spent fruitless years trying to find the tomb of Peribsen; and Seth has spent as many searching in vain for Nar-mer."

Doc turned away from the TV with a laugh on his face. "And a fat lot of good it will ever do them. If those *bas* really were running around like they were saying, they've had five thousand years to hide their *kas* so well the IRS couldn't find them."

A quiet sobbing to my right drew my attention once more to Maura and I saw her eyes brimful of tears. I put an arm around her shoulders. "Whisht," I said. "What is it, Maura?"

She covered her face with her hands. "My uncle; *ochone*, my poor uncle!"

"I know, lass. But he's at peace now."

She turned to look at me with red-rimmed eyes and a haunted look. "No, you don't understand, Mickey. His children had him cremated."■

IN TIMES TO COME

Analog readers, as a group, are pretty familiar with how inheritance works on this planet; and, thanks to the work of Drs. Watson and Crick, even *why* it works that way. But is that the *only* way it can work? Daniel Hatch, in "Seed of Reason," our lead novella for April, has imagined a world where biology is based on a fundamentally and intriguingly different mechanism—which leads to ecosystems and cultures wildly different from anything humans have known. The situation poses several levels of dilemmas for the world's first human visitors. How do you study something that seems to make no sense in terms of everything you think you know? It's little consolation to reflect that human geneticists were in much the same situation all the way from Mendel to Watson and Crick—and the problem becomes much more than academic if you decide to "help." Some things, once started, simply can't be dropped in midstream. . . .

We'll also have a variety of other fiction, from such writers as Michael F. Flynn, G. David Nordley, and Lawrence Watt-Evans. Plus Dr. Richard A. Lovett's science fact article on "Tricorders, Yactograms, and the Future of Analytical Chemistry." Much science fiction takes for granted gadgets that make sophisticated chemical analysis trivially quick and easy. Just how likely are such things, and how might we get as close as we can to them?

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Now You Can
PLAY THE PIANO
In One Easy Lesson!

Amazing "Fast Learning" System for Piano, Organ, Portable Keyboard

Be The Life Of The Party– Dazzle Your Family & Friends

Who, Me? Play The Piano?
Yes...absolutely! If you've always wanted the enjoyment and satisfaction of playing the piano--RUSH TO TAKE ADVANTAGE OF THIS INCREDIBLE OFFER. Amazingly, you start making music instantly. In just 30 minutes you'll have the know-how to perform a dozen complete songs.

You Don't Have To Read Music!
Simply learn the "BIG 3" CHORDS, and that's all you need to play the accompaniments for thousands of songs--folk, pop, gospel, country, you-name-it. Our exclusive quick-study method features a how-to video, song book, and audio cassette. Fascinating, fun--Great for grownups and kids alike.

Complete Kit--
You'll receive all this!

1. **HOW-TO VIDEO**
2. **SONG BOOK**
3. **AUDIO CASSETTE**

Play Along With JOHN DERBIN Famous Piano Pro

For Fastest Service Call Toll-Free* 1-800-981-7071 *Mon.-Fri. 9-5 E.S.T.

Abigail's Treasures, Dept. PAN50, P.O. Box 66, Avon-By-The-Sea, NJ 07717

YES. This is just too good to miss--Kindly rush my Piano Playing Kit(s) so I can try it out for 30 days on money back guarantee.

❑ One Kit (includes Video & Book & Audio Tape) for $19.95 plus $3.95 postage & handling.
❑ **Great Gift Idea!** Two Kits for only $38.95 + $5.95 P&H.
Charge to my: ❑ Visa ❑ MasterCard ❑ AM EX

Acc't #_____ Exp. Date_____

Enclosed is $_____ (NJ residents add sales tax)

Name ❑ Mr. ❑ Mrs. ❑ Ms. _____

Address_____

City_____ State_____ Zip_____

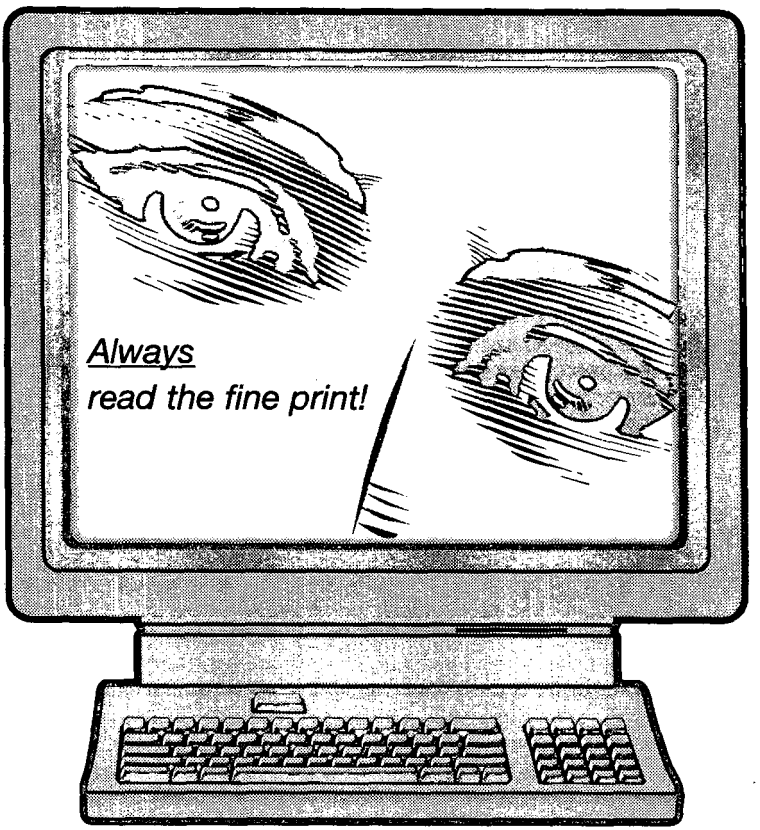
(Please make check or M.O. payable to Abigails Treasures.)
To help process order, you may wish to include your daytime phone number
(_____) _____

Please allow up to 4-6 weeks for delivery. ©1998

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Ramona Lousie Wheeler

UPGRADE



Mark Swift awoke on Monday morning feeling better than he had ever felt in his entire adult life, and he woke up knowing, to the dollar, exactly why. He thought back to how nervous he had been on Friday afternoon, leaving work early to go to the bank and draw out the creds. The great white marble facade of NanoCity Mall loomed up in his waking memory with a peal of emotional trumpets. He had earned them at last. No more hangovers, headaches, allergies or anxiety; perfect health until the moment he died, just like it said in the brochure.

Mark closed his eyes and tried to feel them inside his skin, but, as the Nanoteens had assured him, his private repair crew of little nanite micro-machine attendants was invisible, odorless, tasteless: a reassuring presence with no presence at all that he could sense. Mark leaped out of bed, and bright Monday morning sunshine filled the room as the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

household automatics opened the drapes for him.

He did not brag in the office about his new internal nanite medical team. He had never been good at saving money, and for all he knew he was the last one in the office to buy them. As pleased as he was to have them, he did not want to discover *that* at the water cooler. But he was happy, and he bubbled through his day's routine work. He was good at what he did, and his bosses liked him. Now he was also perfectly healthy, and he allowed himself that long, slow glow of satisfaction that only success can afford a man. He had earned this, and he settled down into his office chair, prepared to enjoy this feeling for the rest of his life.

He celebrated at home with a bottle of wine, although not too expensive a bottle. He had put nearly everything he had into purchasing his nanites. He thought about them rushing about inside him, fixing him, making him perfect, clearing away the day's gathered internal debris, tiny little housekeepers putting everything back where it belonged. He drank a solemn toast to them, and then sat down to his computer diary. He toasted the video eye, and told his diary about how good this achievement felt. "And good night, Monday, October twenty-sixth—the first day of the best time of my life!" He winked at the camera, shut down the system, and went to bed a happy man.

Mark Swift woke up on Tuesday feeling happier and healthier than he had ever felt in his adult life. He hummed to himself, thinking pleased thoughts about his weekend at NanoCity as he got ready for work, and he hummed happily to himself through the routine of his day. Success sang through his every thought, and the October sun shone down as brightly as Mark's delighted mood.

He was briefly disappointed to discove, at the end of the day that he did not have the money to buy a bottle of wine to celebrate the first full day of new health with his wonderful new nanite attendants, but they had been worth the cost. He felt wonderful. He cooked dinner without complaining to himself about the work, and at the end of the evening, he flipped on the computer diary and grinned up at the video eye. "Well, this was the best day of my life. Monday, October twenty-sixth—the first day of the best time of my life!" He told his diary all about NanoCity, and the pleasure of his first day at work feeling himself getting healthier with every breath. He signed off with his usual wink, and went to sleep. Sleep came easily now, no more insomnia.

Mark Swift awoke on Wednesday morning feeling better than he had ever felt in his entire adult life, and he woke up knowing why. All the memories of NanoCity Mall filled him with solemn delight. He closed his eyes, and tried to feel them inside his skin, but there was only a happy, buzzing self-assurance. Mark leaped out of bed, and bright morning sunshine filled the room as the household automatics opened the drapes for him.

At the end of the workday he stopped at the ATM, but couldn't understand why he did not have the creds to buy the bottle of wine he had promised himself to celebrate his first day of nanite health. He was sure he had left himself enough for that. The ATM assured him it was gone. Mark shrugged and went home. He had never been good with money, and there would be another paycheck at the end of the week. The wine was not important. His new, perfect health was. He was humming by the time he reached his apartment. After dinner he sat down to his computer and surfed a little, but nothing held his interest. He was bubbling with happiness and new energy. He read poetry for a time, looking for new verse, but eventually he switched over to the video eye of his computer diary and said, "Hello, Computer. Monday, October twenty-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sixth—the first day of the best time of my life!" and he told the whole story of his wonderful new nanite attendants.

On Thursday morning Mark Swift awoke immediately aware of the joy of his new beginning. Health for the rest of his life. He tried to picture his nanite crew at work inside him, hustling, cleaning, arranging his chemicals to perfection. He leaped out of bed to begin the work week, happy with the thought of his new life. He was so pleased with events, and with life in general, that he wasn't even too bothered, at the end of the day, to discover that buying the nanites had left him too broke to buy even a bottle of wine to celebrate his wonderful new life. It didn't matter. There would be another paycheck at the end of the week. He could wait a few days to celebrate. Mark was happy just to feel so alive.

On Friday morning Mark climbed out of bed, watching the lights dial up and the drapes open to morning sunshine, and found himself filled with calm contentment. His brand-new crew of nanite medical attendants had overnight, it seemed to him, to have transformed everything around him into a healthy, rosy glow. Mark thought with delight that this was only the first day of feeling this good for the rest of his life. He whistled and hummed to himself as he got ready for work.

At the office his coworkers commented that he had been in the best of rare good moods all week. Mark grinned at all of them, enjoying his secret success. If Monday afternoon already seemed like "all week" to them, then he really was enjoying his life more than they.

To his delight, Mark discovered after work that there was more than enough in his bank account to buy a fine bottle of wine to celebrate the first day of his new health. He congratulated himself for having been able to put that much aside before he got his nanites. There was an entire week's pay here!

While lingering over his choices at the Wine Bazaar, Mark felt so pleased with his life that he struck up a conversation with a lovely college student also trying to make a wine selection. She had short, straight hair that was layered shades of orchid, from palest to dark, and the darker orchid color matched her eyes. She was apparently trying to decide between a Zeller Schwarze Katz and a fine Kalte Ente, and Mark made a joke about buying them both so she could watch the black cat chase the cold duck around the kitchen. When she laughed the orchid highlights in her eyes glowed violet, and Mark raced through his memory for another joke. "'Violet she was, and diamond-eyed,'" he said instead, quoting a verse he had learned a long time ago, which suddenly seemed meant for this lovely woman.

To his surprise, she knew the second line, and recited it back with a pleasant, pleasing tilt to her eyebrow and a suggestive lilt in her voice. "And amethyst teardrops fell to her cheek when she cried."

On Saturday morning Mark awoke late, wondering why his alarm had let him oversleep. He had never been late to work before. They wouldn't mind too much. At least the kitchen automatics worked. He could smell the coffee. He hurried into his kitchen cubicle, but stopped cold in the doorway.

There was a perfect stranger, a woman, seated at his breakfast nook, hunched over a cup of coffee. She wore only a white dress shirt—*his* white dress shirt, Mark noted in stunned calm—and her perfectly tousled hair was layers of exquisite orchid. She smiled up at him with orchid eyes. "Morning, luv," she purred sleepily. "Your machine makes better coffee than we can get in the dorm. Would you like some eggs? I think I'm ready for some eggs."

"Who the hell are you?" Mark demanded. "What are you doing in my house!"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Her sleepy, orchid eyes widened, with a smoldering glow waking in them. "What?" she exclaimed.

"Do you think you can just break into my house, and take my clothes and my food?" Mark said. His indignation was sharpened by a nagging sense of alarm, a dread building inside him. "Get out of here before I call security!"

The woman's lovely, silken warmth cooled, and she met his hot, suspicious stance with open disdain. "Did you think I was just some hooker you could pick up and pay off, shove me out the door?" Her voice was much colder than her words. She rose to her feet. "Because, let me tell you, Mr. Mark Swift, if I were a hooker, *you* couldn't afford me!"

She stalked past him through the narrow entry, and he shrank back to avoid touching her. But as she went past him, the scent of her skin and hair left him suddenly breathless, with a fierce trembling, and he realized that the scent of their lovemaking was all over him—a magnificent, hungry scent—and he remembered *nothing*.

"Wait! Please!" he called abruptly, running after her. He pulled up short at the bedroom door. She was dressing, buttoning up with deliberate, angry calm.

"Please," he said breathlessly, pressing his palms flat to the wall behind him to hold himself steady. "I am so sorry, miss. But something happened to my . . . to my memory, to my mind. I don't remember anything . . . anything about last night." He looked over to her, helplessly afraid. "I am so sorry. Please, it's not your fault."

She sat down slowly on the edge of the bed, looking at him. The angry heat of her face stilled as she regarded his words. She continued to study his face as she pulled on her shoes. "You certainly didn't treat me like a hooker last night," she said finally. "We had wine, but I didn't think you got drunk enough to black out."

Mark shrugged. He certainly had no hangover, but there was a reason for that. "Would you be willing to tell me your name—again?" he asked her.

She looked at him in silence for a long moment before answering.

"Gail."

Mark nodded, trying to still the trembling in his knees. "Nice to meet you, Gail. Again."

She made a sad noise in her throat and stood up. She walked up to him, put her hands on his chest and leaned up to place a small, chaste kiss on the end of his nose. "When you're feeling more yourself, Mark, give me a call. You put my number in your diary last night."

"I made a diary entry last night?" Mark felt a sudden hope.

Gail shrugged as she stepped away from him. "You were at your computer last night. I fell asleep while you were still talking to yourself out there." His mysterious orchid, Gail, then walked out of his bedroom, and let herself out of his apartment while he stood, back to the wall, trembling fiercely with the spice-flower scent of her on his skin.

Mark called his office, fumbling over his deskpad to get his computer dialing. He was halfway through a mumbled apology for not coming into the office before he realized that a computerized telephone voice was explaining over his words that the office was closed on Saturdays and no one was in the building. Please leave a message—and Happy Halloween.

Mark hung up, confused. His computer rarely dialed numbers wrong. He made himself dial the office number with his own keypad. And got the same computerized voice, the same message. He hung up and asked his computer what the date was.

He sat staring at the impossible answer, wreathed in the impossible perfume of a lost blossom, feeling healthy and fit and scared out of his wits. He closed his eyes, concentrating on his

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

last memories. What did he remember of last night, of anything? He remembered his own name, his address, what company he worked for, what his job was, who his parents had been. With each piece of solid data fitting back into place, Mark began to regain some composure, some sense of himself. He was not crazy. He just had some horrid memory lapse of the last few days. Sadness washed over him: he had no memory of last night. The last thing he could remember clearly was coming home with his wonderful new crew of nanite attendants.

He searched through his desk for the Nanosity Institute brochures. When he could not find them he began a hasty search of his apartment. Finally they turned up tucked in the frame of his dresser mirror. He looked back at the scared eyes in the mirror, unable for an instant to recognize the tanned, healthy face there. In just six days the nanites had improved his muscle tone, thickened his hair. He looked terrific. Even his fear had an edge of new strength to it.

The technical support telephone numbers were in fine print on the last page inside the brochure, and in even finer print underneath them was the following legend: "Technical Support is available nine A.M. to four P.M. Standard Pacific Time, weekdays only." Mark dialed the number anyway, and after a long wait, got a computerized voice that said the same thing, in neat, Oriental accents.

He called up his diary. The last entry he remembered making was for the previous Sunday night. Everything in his entry indicated complete contentment with his nanites. Mark fast-forwarded through to Monday and listened anxiously to his own, slightly tipsy delight at his new lease on life. The Tuesday-night entry was sober, but just as contented. He listened to himself give the date—Monday, October twenty-sixth. Wednesday night's entry was almost identical—and was also voice-dated Monday, the twenty-sixth. Thursday's was longer, but the same. The computer dated them correctly on the hard drive, but his own voice-date was Monday for each entry. He could see the day-by-day changes in his face on the screen, healthier by the minute, just as the brochure had promised.

Friday night's entry was quite different. Mark saw himself seated at the desk as usual, but he was nude, and Gail, wearing his white dress shirt, was draped across his lap. She turned orchid-colored eyes to his video camera and told his diary her telephone number, following with a fingertip to her purple lips. "But keep it a secret. I don't want just *anyone* calling me!"

Maddeningly, the screen blanked out, replaced by himself in his bathrobe, looking pleased and rumpled. "Monday, October twenty-sixth. The best possible ending to the best possible day of the best time of the rest of my life!" he said happily to the video eye.

Mark turned the machine off, and dressed slowly, carefully, trying to remember.

Uncomfortable ideas snaked into his attention. Had the lovely Gail drugged him somehow, for some arcane, unfathomable purpose? The brochure in front of him mocked him with the absurdity of that idea. Nanites would permit no poison, no dangerous drug effect. He had even been warned that suicide would have to be something explosive to succeed. The only other way he could kill himself would be to have his nanites uninstalled. And that was *expensive*.

Mark sat down to his diary and began a careful, detailed explanation to himself of what had happened today. His voice was shaky at first, but anger began to grow and steadied him until he was speaking quite fluently. When he couldn't think of anymore to say, he just sat looking at the freeze-frame of Gail's or-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

chid eyes looking out from the monitor, her purple kiss. He dug out a package of paper, and printed out that picture, and another that showed the clean curve of soft throat and softer thigh.

He taped these printouts to the refrigerator door, with a handwritten note to himself in tall, red letters: "Mark, you are in *big* trouble. If you ever want to see this woman again, then play back your most recent diary entry. Do it *now*, before you do another thing!—Mark."

Then he called Gail, and told her about everything: the nanites, the diary entries, the lost week.

"Nanites?" Her voice held a sudden edge of distaste. "I think those things are creepy, Mark." She actually shuddered visibly in the video screen of the phone. "I'd never let those things into my body." She took on a look of sudden alarm. "I didn't catch any from you, did I?"

Mark shook his head. "They're not like a disease, Gail. They had to be programmed specifically to my individual body chemistry." The lectures on this part at NanoCity, a requirement for purchase, had seemed endless and unnecessary at the time. Now he groped through his mind for any scrap of information he had held onto. "Any that I, uh . . . that I shed are inactivated once out of my personal chemistry."

Her chin lifted, and her mouth made a sharp, purple frown. "Our personal chemistries got pretty personally mixed together last night," she said evenly.

Mark nodded, forcing himself to meet her eyes in the screen. Why could he not remember her? "They assured me that, uh . . . that is specifically not an issue for your concern." He *did* remember that part of their lecture. They had been quite specific. Using the nanites for contraception would have cost extra, *plenty* extra.

"So ones that I swallowed wouldn't have lasted long in my stomach?" Gail asked coldly.

Anguish swept through him, sorrow for what he had lost. "No," he said clearly. "Nothing I did could hurt you or contaminate you, I promise. I would never let anything hurt you."

Her cold suspicion eased a little. "Maybe you do remember something after all," she said softly.

Mark just stared helplessly at her image in the screen, all the breath in him lost to the ache. "When I call you tomorrow," he made himself say once his breath returned, dreading the silence from her end, "when I call, acting like a stranger, just tell me it was all true, and that I'm not crazy."

"Okay," Gail said. "I'm so sorry this happened to you, Mark. I like you. We had fun."

"I want so desperately to remember you," Mark whispered into the phone. "I remember how I feel about you. No nanite can make me forget that."

"I'll see to it that you remember me again someday, stranger."

Mark could not bear to go to sleep, knowing he would lose hold of his orchid-sweet lady somewhere in the dense nest of dreams. There was a half-bottle of wine left, and he drank that slowly while sitting at his computer desk, watching Friday night's journal entry over and over, Gail curled up so easily on his lap, turning to look out of the monitor and blow a kiss.

He woke up in the bright sunlight of Sunday afternoon, his head slumped across his keypad and the stem of a broken wineglass clutched in his hand. Somewhere in the night, the energy saver on his computer had put itself in sleep mode, and the screen was dark. Shards of broken wineglass were scattered across his desk, and on the floor beside his feet. Mark shook himself awake, anticipating the bite of a hangover, but suddenly he remembered his brand-new crew of nanite nursemaids. He felt bright and shiny-new, and he would just have to apologize to Mr. Olgar for coming in late on a Monday

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

morning. He had been having the most wonderful dream, about a purple lady sitting in his lap and laughing. He wondered if that were a side effect of his new nanites. He stood up, stretching with lazy happiness, and decided to have breakfast before getting ready for work. He was starved.

The bewildering display on his refrigerator door met him with a cold, frightening shock. The woman in the printout was the woman in his dream. Her name was Gail. His own handwriting on the edge of the picture named her, but he already knew her name. He just didn't know *why* he knew.

Mark raced back to his computer desk and turned it on with trembling hands, hastily brushing away the broken glass. He got a splinter in his thumb, and he put his thumb in his mouth, tasting his own blood while waiting for the screen to come alive. Gail was there, smiling out at him, as close as the other side of the monitor glass. He suddenly realized there were nanites in the blood from the glass cut. By the time he looked down at his thumb, however, the cut was healing. Before his eyes, it was gone. He looked back to the orchid-dark eyes in the screen, and sat down and made himself listen to himself explaining.

He remembered sitting at his desk the night before, watching her image in the journal entry. Evidently he had seen it often enough on Saturday night that it had become a permanent memory before the nanites could disassemble it. But he had no memory of the woman herself, nothing of her person except the exaggerated identity of dream. She was as real as anything else in the increasingly confusing story he himself had recorded on his computer.

Mark sat watching the video of her over and over until his courage at last rose, and he called the telephone number. "Mark? Is that you?" Gail said instead of saying hello. Her telephone had told her who was calling. She was asking a different question. She had the videosend on, and he could see her; she could see him, too.

"I remember your face," Mark whispered. She was so beautiful he wanted to cry, but he had so many reasons to need to cry just then. "Your name is Gail."

She smiled back at him, and touched a fingertip to the camera lens, so that for an instant she touched the image of his face. "Very good, stranger," she said, relief clear in her voice.

"'Call me not a stranger,'" Mark said, quoting something that popped into his mind from long ago, from before there were nanites. "'For a young man's gone before.'"

"'I'm told that it was I myself,'" Gail said, taking up the verse. Tears sprang to her eyes.

"'But now I can't be sure,'" he replied.

Gail laughed, laughter lighting her dark eyes as she looked out at him from the screen. A line of amethyst tears ran down one cheek. "I am sure it's you, Mark. You quoted poetry when you made love to me, beautiful poetry."

"'There once was a girl from Nantucket,'" he quipped, grinning.

They both laughed.

"I'll call you in the morning, before your alarm, to wake you," she offered. "Will that help?"

"Yes." His voice squeaked on the word, and he made himself say it again, more clearly. "Yes, please."

Gail nodded, smiling into the screen. "I can't come over now, Mark. I'm sorry. I have an important seminar. I can't afford to miss it."

"Call me in the morning?"

"It's a date."

They looked at each other through the video screens that linked them, through the distance that separated them, total strangers, both in love with people who had disappeared.

Mark walked around his apartment

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

slowly, rearranging his furniture so that he would be startled in the morning and forced to look carefully when he got up. He had only one visible clock in his apartment, a digital with big numbers in the bathroom beside his shaving mirror. He had always preferred not to think about time when he was home from his day's work at the office. Now each second of his precious Sunday afternoon was sliding through his fingers like drips of melting snow. He had already forgotten one night too precious to lose. When he woke up tomorrow morning their phone call would have evaporated. He set his computer to announce the time every hour on the hour in clear voice, including the day of the week and the date of the month. He disabled the energy saver, and left Gail's orchid-colored smile on his screen. He wasted time wishing he had been able to record their videophone conversation, but that was not legal anymore. As he went about his apartment, rearranging things, writing notes to himself to explain what he would no longer remember tomorrow, he went over the memory of her face in the phone screen, her voice reciting. She knew the poetry that he loved, knew it by heart the way he did. She was as real to him as poetry, and as intangible.

For the remainder of the Sun's march into twilight, Mark paced on his tiny balcony, looking out at the city he so loved, reciting aloud every poem he had ever memorized, every line he could pull out of his traumatized soul. He even stood in the last setting rays, declaiming in Shakespearean dramatics the very first poetry he had memorized as a child: Dr. Seuss's *Horton Hears A Who*.

Mark was halfway through this recital before the impact of the little Who creatures, too small to be seen yet nonetheless revolutionizing a world, hit his conscious attention. The impact of their simple myth upon his own dilemma overwhelmed him so intensely that not even his nanite attendants could keep up with the breathtaking sweep of emotional pain. He sat down in the middle of his jumbled TV room and cried as he had not cried since his parents' death so very long ago. All the while his body sobbed and wept, a single eye at the top of his head was remembering, over and over, a smiling, orchid-eyed face promising that she would wake him from this nightmare in the morning.

Gail woke him. The telephone beeped and beeped, and fell silent, and beeped and beeped until he pulled himself up from his tangle of limbs on the floor and fought his way through fog to the phone.

"Mark?" his angel named him, called him. "Mark? Is that you? This is Gail. Do you remember Gail?"

"I love you." That was all Mark could make himself say, and he startled himself with it. Who was this person?

Her laughter in the phone link was as warm as morning sunshine. "That's a good start, stranger. Now go read your diary. I am calling to tell you that you can trust the notes you left for yourself, no matter how odd they seem. I can't be in today, but call me when you get home from work. Okay?"

Mark nodded breathless assent, aware that this mysterious face was more important to him than his own, and yet completely mystified as to why. She blew him a kiss, and was gone.

Mark immediately fell over the magazine stand that was usually in a far corner of his room. Nothing was where it belonged. He sat on the floor looking around, feeling some curious emotional bubble swell inside him, as though he were rising through an etheric dimension that did not include simple gravity. He swallowed hard and made himself stand up. His brand-new nanite attendants should be dealing with this. He started for his computer desk, and realized that there were sheets of paper taped up on every surface in the room: walls, windows, cabinets, computer

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

screen. His own handwriting was clear in the harsh red marker ink and bold lettering. He had left notes for himself everywhere, and he had no memory at all of having done any of this. Had the nanites done this to him, all this on his first night home from NanoCity?

Mark wandered around his apartment, reading his own notes. He had a sense that he should be outraged by the story he found here in his own words—horrified, surprised, but the relentless nanite horde could not stand up against his constant astonishment. He had a sense of calm recognition—not of the details, but of the situation. The strange familiarity of the woman who had telephoned to wake him struck a chord in him as deep as his need to breathe. He trusted her without the slightest idea why. She evoked a sense of orchid-spiced ecstasy just at the periphery of his conscious mind, a sensation so delicious that he was willing to face his own horrific lack of memory if it meant he could solve the dilemma of her dark purple eyes.

Mark called his office and told them that he could not come into the office today. Sheryl, at the desk, was inordinately pleased to hear that he was really okay and just had some personal things that could not wait. Her perky dismissal of his importance—"Oh, don't worry, Mr. Swift. I'll pass the word along!"—made the skin at the back of his neck go chill, touched with icy needles.

He asked his computer for the time-zone equivalents of Standard Pacific time so that he knew when he could call Nanosity Institute Technical Support in hopes of reaching a human technician to whom he could explain his dilemma. Noontime was the earliest he could call. He wrote notes to himself all morning, and had his computer speed-dialing Nanosity at 11:59:30 A.M.

Busy!

He pictured room after room of anxious callers around the world, praying they could explain their need for help before they forgot it again. The image swept away all orchid memories.

While he sat at his desk waiting for the final put-through, he reprogrammed his computer to play the sound-file of Gail's giggle as she blew a kiss to him through the monitor screen every time a menu changed. The ache to remember that moment faded, eaten away by persistent nanite cleanup crews, but he felt it anew every time his computer chewed through another subroutine, and her voice laughed again. Mark set his computer for repeat-dial, and paced around his note-filled rooms waiting for the computerized voice that would tell him he had at least connected to the service number, and was now on hold. Two hours later the "attend" signal chimed.

The living human technician's voice, when it surfaced in the speaker, was almost unrecognizable. Mark stared uncomprehending at the artwork on the screen. Service technicians did not show their faces as they talked one through problems. Instead icons led one through the maze. "Hello, sir," the technician's voice said. "My name is Dion Marcus. Can you state the nature of your problem?"

"Your nanites steal my memory, Dion Marcus." Mark was so startled by this human's living arrival that his manners fell away, leaving only his raw fear. "I want my memories back."

"Let's get some information on you, sir, so that we can help you properly. And you are . . . ?"

Mark spoke carefully and slowly as he told Dion Marcus who he was, who his insurance company was, his insurance number, his social security number, the model number of units purchased, the credit bank he drew from, where he lived, when he had shopped in the Nanosity Institute at NanoCity Mall and what had happened to him since. The man listened with irritatingly exaggerated patience, insisting on spelling back

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

every name and checking every single number entry.

Mark was drenched in sweat and shaking with suppressed rage by the time Dion finally said, with a sharp, professional exhalation, "Well, Mr. Swift, I see your problem. You purchased our basic, bottom-of-the-line product, and I am afraid that the nanite programming required to safeguard your short-term memory neurochemicals is just beyond the range of that unit's preprogrammed parameters. Their preprogramming restores everything to statistical norms, based on your own personal statistics." Dion's voice lilted up at the end with the vocal suggestion that this was, after all, the smartest thing that Mr. Mark Swift had ever done.

Once Mark had realized the man had stopped talking, he said hoarsely, "But I want my short-term memory back."

"Oh, of course, Mr. Swift! The upgrade to that nanivision software is only a download away. Once installed on your computer system you can reprogram your own nanosystem simply by sitting in front of your monitor and looking at the video. The flashing bar-code is transmitted to your nanosystem via the nanites in your cornea. That's all it takes to reprogram your nanite subroutine structures with the appropriate chemical codes for complete short-term memory neurochemical backup."

Mark Swift made himself ungrip his fingers from the edges of his desk, putting them in his lap, remembering purple. "And what does this upgrade cost?" he asked. He could hardly hear himself.

Dion named a sum *far* in excess of what Mark had paid for his nanites themselves: an outrageous sum, more than he could save in years.

"According to your credit report, Mr. Swift, you should be able to save this amount in eighty-two months or so. After all, you have all your physical needs automatically supplied. Your employer pays your bank, and your bank pays your bills. We can arrange an automatic savings plan. If you just don't spend more than you need to live, and continue going to work during this time, we can arrange to contact you when the amount is complete. Meanwhile, you will remember how to go to work, how to enjoy your job, your life. Many of our customers find they truly enjoy this system, Mr. Swift. You would be *amazed* at the numbers of people who never bother to get the upgrade. Trauma, boredom, all unpleasantness is washed clean by sleep. Your world truly will look better in the morning—*every* morning!"

"I want my memories back! My friends!" Mark knew, even as he spoke, that it was an empty protest.

"Friends, Mr. Swift? Memories?" Dion laughed a laugh so professional, so understanding that Mark's will power wavered. "Nanosity Institute does not serve its clients blindly," Dion said. "You were thoroughly researched before we accepted you into Nanosity's community. You *have* no friends, Mr. Swift. Your life is a round of routine, one day quite the same as another. The news? The difficulties of the world troubling you day after day? Don't worry, Mr. Swift. We will check in with you regularly. We will . . . *remind* you. When your funds have reached the point at which you can afford the upgrade, we will contact you, and we will explain your options."

There was no face to him, this Dion Marcus, just a professional, happy voice pouring out of a faceless corporate nightmare. "You can decide *then* if you want your memory back, Mr. Swift," he concluded.

"I need it *now*!" Mark shouted, strengthened by the bull-sound of his own voice.

"You'll feel better in the morning, Mr. Swift," Dion said. The line went dead.

Mark Swift sat staring at the screen, sickened, burdened, overwhelmed by the horrid truth of the man's words.

He would, indeed, feel better in the morning. ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

BEFORE THE BIG BANG

This column describes pre-Big-Bang cosmology, a new alternative to standard Big Bang cosmology that reaches all the way back in time to the era before the Big Bang in order to remove some of the arbitrary assumptions from the model. It's in part the work of Gabriele Veneziano, a theorist at the CERN Laboratory in Geneva. We'll begin by reviewing the standard scenario of the origin of the universe.

The standard Big Bang model describes our universe as having started as a tiny region of space that was supersaturated with energy, forming an ultra-hot ultra-dense medium in which the gravity was so strong that it curved space back on itself in a distance of about 10^{-34} m. The universe would have collapsed into a black hole, except that the matter in it had a tremendous outward kinetic energy that balanced the strong pull of gravity.

As the universe became larger it cooled from its ultra-dense ultra-hot origins. The fundamental interactions sorted themselves out into the strong, weak, electromagnetic and gravitational forces. The mixed soup of neutrinos, matter, and light cooled and separated, and the components went their separate ways. Matter congealed into dust clumps that became galaxies. Stars formed, exploded in supernova violence, and formed again, repeatedly recycling matter into heavier elements. Planets formed around some of the stars and became infested with life. We came along very late in the game to try to piece together all that had previously happened. The result is what we call the Big Bang model.

The problems with this version of the Big Bang model are ones of "tuning." First, there is the "horizon problem." A hypothetical observer looking at the sky immediately after the Big Bang would see the horizon of the visible universe (the distance at which light is Doppler shifted to zero energy) only about 10^{-34} m away. Immediately after the Big Bang, each spatial region of this size became causally disconnected from the many other similar regions. Today, however, the horizon of the visible universe combines 10^{90} of these disconnected regions, some of which are only now coming into causal contact with the rest of our universe. There is no particular reason why these 10^{90} regions should resemble one another at all, yet we know from the COBE microwave background measurements they vary at most by one part in 100,000. The remarkable smoothness of the universe is a fundamental mystery. Why are the 10^{90} independent pieces of today's universe so similar? This is the horizon problem.

A similar problem, the "flatness problem," is raised by the remarkable lack of curvature, either positive or negative, of the present universe. There is a nearly precise balance between the expansion energy and the gravitational pull on the universe. Gravity and expansion are within about 15% of perfect balance.

Consider this as a problem in escape velocity. The mass of the universe is like a cannonball fired upward against gravity at the Big Bang, a cannonball that for the past 8 billion years has been rising ever more slowly against the pull. The extremely large initial kinetic energy has been nearly cancelled by the extremely large gravitational energy debt. The remaining expansion velocity is only a tiny fraction of the initial velocity. The very

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

small remaining expansion kinetic energy and gravitational potential energy are *still* within 15% of one another. To accomplish this the original energy values at one second after the Big Bang must have matched to one part in 10^{15}. The happenstance that two independent variables should match to such unimaginably high precision seems unlikely. Something must be locking them together. This is the flatness problem.

The currently accepted solution for these problems is called the "inflation scenario." Inflation assumes that in the very early stages of the Big Bang, for reasons not well understood, the universe expanded at an exponentially increasing rate, the radius growing much faster than the speed of light. This superluminal inflation brought all the 10^{80} regions into causal contact and homogenized them. The inflation scenario assumes a special force field (the *inflaton* field) which allows the universe to roll downhill in potential energy, driving the exponential expansion and simultaneously creating the mass-energy in the early universe, thereby locking expansion energy and gravitational potential together because they have the same source. This locking explains the observed expansion-gravity balance of our present "flat" universe.

The problem with the inflation scenario is that while it solves two vexing problems of cosmology, it seems rather contrived and it raises many unresolved questions of its own. Why is the universe created with the inflaton field displaced from equilibrium? Why was the displacement the same everywhere? What were the initial conditions that produced inflation? How can the inflationary phase be made to last long enough to produce our present universe? Thus, the inflation scenario which was invented to eliminate the contrived initial conditions of the Big Bang model, shows the need for contrived initial conditions of its own.

Because of the problems with the inflationary scenario, Veneziano and others have recently been looking in another direction to account for our present universe. Veneziano has attempted to apply to the universe itself the techniques of superstring theory, which is a discription of a fundamental particle (electron, quark, etc.) not as a mathematical point but as a tiny loop of string embedded in a multidimensional space (see my Alternate View column about the Klein-Kalusa theory of multidimensional space in the April 1985 issue of *Analog*). Superstring theory is mathematically interesting but is experimentally untested (and perhaps untestable). Veneziano's uses the so-called "scale-factor duality" of superstring theory, which can be represented as a symmetry in the time domain. If one knows the behavior of a string-dominated system for positive times, the system's behavior at negative times can be predicted. He applies this duality to the universe before and after the Big Bang, in effect reflecting the universe in the duality mirror in order to examine its condition before the Big Bang

The image universe behind the mirror looks very different from ours. It starts as a nearly empty, cold, flat space. It is a very simple object, lacking in structure, and describable by a minimal set of parameters, but it is dynamically unstable. According to Einstein's equations of general relativity as applied to this system, a small patch of this simple universe fluctuates slightly, and because of the instability, that patch begins to expand exponentially. As it approaches t=0 (the Big Bang) from the back side, this pre-universe develops a rapidly increasing Hubble parameter (or expansion rate). It squeezes through t=0 point with a maximum expansion rate, emerging as the small, hot, dense system, the Big Bang from which our universe evolved. The cold flat universe behind the mirror has produced the ultra-hot ultra-dense kernel that we had taken to be the beginning of everything.

Another way to play this scenario is to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

run it backwards, starting with some familiar universe-model on this side of the Big Bang and extrapolating backwards to the pre-universe on the other side. When this is done, it is found that closed universes (with too much mass and an omega-parameter greater than 1) must begin with a singularity, while open universes (with too little mass and an omega-parameter less than 1) evolve backwards to a flat cold universe as described above. The preponderance of evidence suggests that our universe is open, and therefore it is plausible that our universe started as the flat cold system of the latter scenario.

Pre-Big-Bang cosmology therefore appears to be a very promising line of theoretical development. It avoids the fine-tuning, since the description of the pre-Big-bang universe is very generic. The related problems of horizon and flatness are solved without theoretical gymnastics by simply extending superstring theory, developed to explain particle behavior at the smallest distance scales, to the grand scale of the universe itself.

As I observed at the beginning of this column, one of the regrettable features of superstring theory is its lack of experimentally testable predictions. It is therefore fair to ask if pre-Big-Bang cosmology has the same problem. The answer to this question seems to be "No." There seem to be at least two feasible experimental tests of the pre-Big-Bang model. The first is that the fluctuations at the Planck scale which triggered the exponential expansion of the pre-universe will be preserved by the process and stretched out in size by the red-shift accompanying the pre- and post-Big-Bang expansions. These fluctuations should be observable in small-angle variations in the cosmic microwave background. Fortunately the small-angle structure of the cosmic microwave background is already of great interest, and satellite microwave measurements are currently being implemented to look for just such effects.

Another test involves LIGO, the gravity wave detector (see my Alternate View column in the April 1998 issue of *Analog*) currently being constructed using NSF funds and scheduled completion and first operation sometime in the year 2000. LIGO consists of a pair of L-shaped gravity-wave detectors, one located in Eastern Washington State and the other in Central Louisiana. The pre-Big-Bang scenario implies an unusual spectrum for "relic" gravity waves from the initial expansion, predicting an energy-density that rises rapidly with frequency. This prediction, for plausible ranges of parameters of the underlying superstring theory, should be detectable using correlations between the two LIGO detectors. This could be one of the first results to come from LIGO.

This is an exciting time. In a few years we should know if the initial promise of the new pre-Big-Bang cosmology can be supported with experimental data. If this turns out to be the case, the same data will also indirectly provide the first experimental evidence for superstring theory, which has up to now been sustained only by its mathematical elegance.

Thus, we have the prospect of seeing further back in time than we had ever imagined, not only back to the kernel from which our universe exploded, but much further back than that, back beyond the Big Bang to an era when the universe was cold, flat, empty, and unstable. ■

References

"A Simple/Short Introduction toe Pre-Big-Bang Physics/Cosmology," Gabriele Veneziano, preprint hep-th/98002057 v2 in the LANL Archive, (March 2, 1998).

"Detecting relic gravitational radiation from string cosmology with LIGO," Bruce Allen and Ram Brustein, Phys.Rev. D55 (1997) 3260-3264, preprint gr-qc/9609013 in the LANL Archive, (September 5, 1996).

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ASTOUNDING SCIENCE FICTION

Collector's Series Trading Cards

Return to the origins of the science fiction genre with the complete collection of all 50 *Astounding Science Fiction* trading cards.

Each full-color card depicts a different classic cover from 1930's and 1940's issues of *Astounding Science Fiction.* Fascinating background information written by noted science fiction historian Bob Weinberg is also featured on every card.

Order this unique collector's item today!

PENNY MARKETING

Dept. SM-100, 6 Prowitt Street, Norwalk, CT 06855-1220

☑ YES! Send me _____ *Astounding Science Fiction* trading card sets (DATRCD) for just $11.95 plus $3.50 shipping and handling each. I save 20% off the regular price. My payment of $ _____ ($15.45 per set, U.S. funds) is enclosed.

Name _____
(Please Print)

Address _____

City _____ State _____ ZIP _____

Make checks payable to Penny Marketing. Allow 8 weeks for delivery. Add $2 shipping and handling for delivery outside the U.S.A. ($17.45 total, U. S. funds). CT Residents: Pay $16.38 per set to include state sales tax. Offer expires 12/31/98. 068C-NSTCL2

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Shane Tourtellotte

"IMAGE OF AN IMPERFECT GOD"

When you try new things, you're likely to make mistakes you couldn't anticipate. But is that a reason not to try?

Illustration by Shirley Chan

"This is a bad idea, Susan." Susan Wrigley ignored her sister's warning, hastening her tottery gait down the bright hospital corridor. She caught a brief glimpse of an emaciated man, unnervingly close to her age, in one semi-private room. She winced from the stench of antiseptics and excreta stabbing into her nose.

"Julia won't want to see you, Susan. Shouldn't that be obvious?"

"No, Mag, it shouldn't." She scanned the nearest door. Four numbers away. "Maybe this illness has shifted her obstinacy. Maybe she'll want to reconcile." Two numbers. "God knows there may not be much more time."

"Don't be saying things like that to her."

Susan turned, mere feet from the door. "Don't tell me what I can or can't say. Now come inside and be quiet—or stay here and be quiet."

Susan marched through the door, head high in certainty of her belonging. A nurse was tending to the equipment around the nearer bed. She turned, and sucked in her breath. Her patient lifted her head, and her eyes narrowed to slits.

The faces were the same. The chins jutted the same way; the noses were identically long and thin; the ears had the same large, loose folds; the sad wrinkles cut as deeply. Their once-brown hair had faded to brittle white. Their

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

eyes were the same muted blue, with the same two brown specks above one pupil—but the expressions behind those eyes were not the same.

Susan momentarily recoiled, unprepared for the absolute likeness. Julia wasn't surprised, and didn't lose a second.

"I don't want that woman here!" Julia rasped. "Nurse, get her out!"

Recovering, Susan advanced. "I have a right to be here, Julia."

"No you don't. What are you waiting for?" Julia's eyes left the nurse, settling past Susan. "Aunt Margaret! Why did you bring her here? Why?"

Margaret pulled gently at Susan's shoulder. "You really should leave."

"No." Susan wrenched her shoulder free, but the nurse came, sternly determined. "No."

"I won't have my patient disturbed. You two will have to step outside."

"No," said Julia. "Let Margaret stay."

The nurse let Margaret slip past, but firmly herded Susan into the hallway. She looked hard at the woman, the image of her patient, and a frown set upon her mouth.

"I have a right, Nurse—" She squinted at the plate above her breast. "Nurse Delgado. I have a right." Her insistence was weak, defeated. "At least tell me what her condition is."

Delgado relented slightly, shepherding Susan to a bench, mechanically helping her sit. "Ms. Wrigley came in with mild pneumonia a week ago. The infection left her susceptible to septicemia, which we caught and treated early. She's recovering, and should be ready for discharge in—actually, you should speak with Doctor Qiu about details."

"Has she—has she been in much pain?"

Delgado hesitated. "She's as comfortable as we can make her. If you'll excuse me."

Susan hooked her wrist with knotted fingers. "Could she still die?"

The nurse held her expression steady. "From the septicemia? Unlikely." She separated herself, but paused. "I want to check my assumption. You are Ms. Wrigley's mother, correct?"

Susan laboriously raised herself to full height, still rather small. "That's right."

A detached mask fell over Delgado's face. "I thought so. Good-bye."

She walked back toward Julia's room, leaving Susan Wrigley fuming behind her. She had seen that look before Delgado cut it off, the disapproval, the instant judgment and condemnation. It was so common of people, so narrow.

It was just like her daughter.

"I tried to tell her, Julia. She wasn't listening."

Margaret stroked her niece's disheveled hair, a soothing action for both of them. "You should have stood in the way," Julia said, not entirely in earnest. "She couldn't get past you."

Margaret smiled discreetly. She was a well-preserved seventy-six, and yes, she probably could push around her sister if she wanted to. "Susan's a stubborn woman," she said instead. "That shouldn't surprise you too much."

"Don't say it."

"Say what, dear?"

"Say 'You're just like her.'"

"Honest, Julia, I wasn't going to say that." But she had been implying it, apparently to the wrong effect.

Julia brooded for a moment. "You know how I feel about her, as well as anybody."

Nurse Delgado reappeared. "Excuse me a moment. I have work to finish."

"Go right ahead." Margaret gave them space, and herself time for thought. Yes, she did know how Julia felt about her mother. She had carried that burden most of Julia's life.

Susan Wrigley had rejected notions of family for thirty-five years. She had no misgivings about her own parenting abilities. Her concern was how the father would manage to wreck things, as husband, or live-in, or just as someone

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

who interfered where he was no longer wanted or needed. Even anonymous sperm donation worried her, with its DNA roulette whose odds she couldn't properly measure.

The Seed Project changed everything.

A daughter conceived entirely of her own genetic material; a duplicate; a clone. Susan knew it was right. How could she not know how to treat herself? Even the child's clean-slate personality would be the same brand of slate. She couldn't fail.

The futile protests against the cloning project merely strengthened her resolve. She scorned those people vainly trying to impose themselves on *her* child. This would be hers, in every possible way.

A month before her thirty-sixth birthday, a cell packed with nucleic material from her stomach lining divided in the Seed Project's lab. She was implanted the next day, and within weeks knew the pregnancy had taken. It was a wild success, beating the low odds on a single implantation.

The pregnancy developed naturally—one would say uneventfully in most other circumstances. On a snowy day, a Caesarean section delivered her of one of the first dozen human clones in history. The procedure had gone perfectly—even though disaster already loomed.

Nurse Delgado left the monitors to flash and chirp at each other. "Your fever has nearly dissipated," she told Julia, "and the sputum is beginning to clear. You can wait for Doctor's Qiu's confirmation, but I'd say you're over the hump."

Julia managed a smile. "Thank you, Alicia," she said, then gave a short wave of her fingers toward the door. Delgado took the hint, and left them alone.

"I have something for you." Margaret pulled a small wrapped and bowed box from her purse. "It's a couple days late, but happy birthday."

Julia took the box, more graciously than she felt. Turning forty-three didn't make her want to celebrate. She picked slowly at the paper, her fingers barely able to get a purchase. She got it unwrapped just before Margaret would have interfered on her behalf.

"Oh, this is nice." It was the latest in wrist-strips, providing time, weather, and news flashes, and lined with gold on its outer edges. "You shouldn't have."

"Oh, yes I should."

Julia smirked. "All right, you should have. It just makes me feel awkward asking a favor of you, right after receiving this."

"Go right ahead and ask." Margaret dragged a chair over for herself.

Julia couldn't mirror her aunt's ebullience. "They don't let me have a terminal here—God knows why—so I need you to do research for me."

"The professional, asking for help? This must be important."

"It is," she replied, nettled by Margaret's natural bantering attitude. "I need a list of nursing centers, anything within fifty kilometers. I'll find a way to check them out later, but I need the list." She waited to hear an answer. "I'm not looking for an argument."

"I hadn't given one . . . yet."

"Well, don't. My health can only get worse from here on. It's time to accept that, and act accordingly."

"And give up your work?"

"I can probably find some place that would allow me computer access. I could maintain a light schedule ... or I could just let it go. It isn't that important. So, will you help or not?"

"I'll help," Margaret said contemplatively. "You deserve that."

She anticipated some time to think once she got back to her condominium. What she got was Susan meeting her almost before she got off the bus.

"You have spare room in your home, right, Mag? Silly, of course you do now. I want to get out of my hotel here. I'm not exactly made of money."

"Susan—" Margaret sighed. "You're

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

welcome to stay, but there isn't much point. Good afternoon, Mister Hutton," she said to a neighbor.

"There would—oh, do slow down—there would be if you'd do something."

Margaret kept herself looking forward. "I've been her connection to our family for a quarter century. I think I've 'done something.'"

She unlocked her door, and held it open for Susan. The living room was well lighted, even on that cloudy day. Photographs hung on walls and stood on nearly any open flat surface.

Susan quickly gravitated to one frame. Margaret and her late husband dominated the center, with their three children surrounding them. Julia was with them. She must have been about twenty—and looked like Susan had at thirty-five. Her smile was a shadow compared with all of theirs.

She turned the photo away from her eyes, wincing briefly. "I want her back in my life, Margaret. All you've done is shielded her from me, kept her to yourself, as if doing her some favor."

Margaret bridled, but couldn't respond. She didn't know what she could say.

"Why won't you answer?" Susan said. "Maybe it's because you understand. Maybe you know you've helped her nurse a pointless grudge all her life. I did everything right for my daughter, and have nothing but estrangement to show for it. Do you think that's somehow right?"

This time, Margaret had an answer. "Yes." Maybe not fair; maybe not just. In its way, though, it was right.

Even before Julia was born, reports had begun to spread. Cloned animals were starting to show signs of premature aging. The news created alarm, then a backlash against the panic, then a slow, mounting certainty that the studies were right.

Scientists had a reason even before they were sure there was a problem: DNA aged. Every time a cell divided, DNA lost telomeres, pieces of useless information on the ends of the molecule, discarded during duplication. Eventually, the telomeres were used up, and unable to divide, the cell would wear down and perish

Reproductive cells came complete with full telomere buffers. DNA in the rest of the body reflected the age of the person. When Susan Wrigley, or anyone else, went to be cloned, their ova were stuffed with cellular material from their aged bodies.

Susan tried to keep Julia unaware of these fears. Still Julia learned, through constant precautionary hospital tests, pieces of chatter she heard, and the overpowering sense that something was unspeakably wrong.

She didn't need overt signs, her menarche in fourth grade, the first indelible lines on her face in sixth grade, or the many smaller deviations from normal girlhood. She knew from the arm's-length pity of classmates and teachers, and from how her mother was shunned by people who knew, even some family.

From her mother came the constant drumbeat that nothing was wrong with her, that her situation—never 'illness,' or even 'condition'—didn't need to affect her as a person. Too late. It had. It did. No reassurances from her mother changed that, and as the symptoms became plainer, Julia's resentment spiraled. When the break came, it was final . . . exactly as Julia intended.

Susan gasped. "What are you talking about? You think I deserve this treatment, for nothing but an accident of birth?"

"Accident?" Margaret erupted. "Julia was anything but an accident. You arranged her. Everything you could control about her coming into being, you controlled. You were so sure everything about her would be perfect, and why? Because it was you, all you. Your plan, your execution, your very own DNA, all yours. You didn't notice the hubris you

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

were also putting in, though. Oh, some ancient Greek playwright would have made his career writing about you."

Susan swung around, dragging the photo frame in her hand with her, gouging the dark wood where it had rested. "How can you blame me? How can you hold me responsible?"

Margaret replied very quietly. "I don't hold you responsible. Julia does, because you didn't."

"What are you talking about?"

"About your being willing to take personal credit for all her outstanding strengths, then distancing yourself from that one weakness you never imagined could happen. You still thought it was all due to you—all the good, but none of the bad. In her one defining trait, you denied Julia was yours. You disowned her."

Susan's hands shook. "Liar!"

"You never let Julia be completely your daughter," Margaret said, still so gently. "I don't blame you for her condition. I blame you for pretending it had nothing to do with you. If Julia blames you for worse . . . maybe she has a right."

"She has no right. *You* have no right! I encouraged her to live a normal life, to not give in to the attitude that she was damaged, less than human."

She thrust the hand holding the picture at her sister. "But she surrendered to it. She retreated, and you helped her. You validated all the prejudice and judgment heaped on me for forty-three years. That wasn't support. It was justification to be a recluse, to turn her back on life. That's what you've done for her."

Shuddering and breathing hard, Susan shuffled toward the door, then turned back. "If her life has been miserable, you can blame yourself!" She found the picture frame in her hand, stared in surprise, then threw it. She had aimed for a cluster of photos on a table, but only managed to break hers against its leg.

Margaret let her go, weakly slammed door and all. She bent to collect the pieces, wincing at a twinge in her knees, then at a nick delivered by a shard of broken plastic.

That confrontation had been lurking for twenty-five years. It was a miracle it had taken this long, but still it had happened. The enmity had spread; the split had widened. For a short, self-indulgent moment, Margaret wondered whether she would see her sister again.

She gazed at the photo, at herself, Matt, the kids, Julia. A picture of family; a picture of unity. That didn't break quite so easily.

Her spasm of pity faded. She had work to do for Julia. For family.

As she sat at her terminal, waiting to get on-line, Susan's spiteful words picked at the bruise they had created. She hadn't been right . . . but she wasn't so far wrong. Combined with what she had experienced at the hospital, it formed a dreary picture. One Margaret decided to try to brighten.

She set to work, with two jobs now in mind.

"Sorry this took two days, Julia. I hope this makes up for the delay."

Julia held out her hands for the gift, an arrangement of cut flowers in a self-monitoring bowl. "They're lovely." She took a sniff, then stretched unsteadily to set them on a table. A coughing fit racked her.

"I've got them." Margaret relieved her of the bowl with a spare hand.

Julia gulped a fresh breath. "Thanks. Oh, give me the instruction booklet out of that side pocket. That much more reading for me."

Margaret set the booklet by Julia on the bed, then held out her own slip of paper. "I have everything here, and on disk," she said, patting her purse. "I went farther afield than you asked."

"All right, but I prefer something close by."

"I don't mean farther in distance." She unfolded the paper and handed it

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

over. "The first group is for nursing homes, like you asked. Those two addresses in the middle are hospices."

Margaret waited for a reaction, but all Julia evinced while glancing at the listings was the shudder of a suppressed cough. "At the bottom are the important listings. They're research centers, hospital and university, doing work into ATTs."

Julia skipped a beat—she of anybody had heard of artificial telomerase therapies—and then tightened. "Not interested," she said, folding the paper. "You must have heard what happened with those first subjects, their whole bodies a mass of runaway cancers within weeks."

"Years ago, Julia. Lessons learned."

"Well, I'd rather not submit myself to their trial and error. You said you had a disk?"

Margaret reached into her purse for it. "They're trying to help people, reverse aging across the board. They certainly might help you. If you do nothing. . . ."

Julia filled the heavy silence. "I know what happens if I do nothing. I can accept that. I *do* accept it."

Margaret had the disk out, but withheld it. "Julia, you know medical facilities are hotbeds for infections. You put yourself into a nursing center, and with your compromised immunity, something could carry you off before you have a chance to fight. You'd be gone before your time."

Smiling tolerantly, Julia put her hand on Margaret's. "I appreciate your caring, but . . . I think my time is now. I've known it would be this way since . . . since I can remember."

Julia withdrew her hand, snatching away the disk as she did. She shook out the paper and read it again, paying attention to the middle section.

She was right about that, Margaret thought. She had known about her fate essentially from the beginning, and prepared herself. Even as her affliction pushed her into a shell and severed her from her mother, it steeled her for complete responsibility for herself.

Julia left home the day after graduating from high school, not telling anybody where she had gone. She entered college as planned that August, paying her own way. Her mother found her address on campus, visited, and went away crushed and angered at the hostile reception from her only child.

Checks came at irregular intervals. They went back more regularly. When Julia found her first junior semester paid off, she wrangled long with the campus bursar to cancel the payment and make it herself. That episode thankfully ended the unwelcome attentions.

She went straight from graduation into work as a freelance researcher. She had the knack of sifting useful knowledge out of the great mass of undifferentiated megabytes, of making neglected databases yield troves of information. She could even search paper and microfilm resources effectively—but didn't prefer to.

She worked best from home, being useful without being exposed. She was easily good enough to work in a firm, but refused. Layers of disability protection laws would descend to cocoon her, incurring her employer's resentment, injuring her pride. She told people that, and it was the truth—though it wasn't the reason.

Julia lived frugally, saving all she could. Her working lifespan would be shorter than most, compared to a senescence promising to be at least as long. It was the only responsible thing she could do.

Her body didn't deteriorate in perfect synchrony. She escaped the arthritis that pestered her aunt and mother; her mental faculties remained almost untouched; her heart stayed strong, with the modest wear of her modest age. Still, too much inside degraded at a gallop—along with the outside. She soon looked every day her mother's age.

It was her immunity that did her in,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

her susceptibility to nagging maladies, and to hardened, treatment-resistant illnesses like the pneumonia that brought her to the hospital. She could possibly keep working, but that took will, a will consumed by the single-mindedness of her life, now perhaps exhausted.

"It's not like you to quit," Margaret told her niece.

Julia turned. "It's not like you to nag," she said, then returned to her studious repose.

Margaret subsided, then readied herself for a sharper exchange. "My mistake. You are being typically self-centered."

Julia dropped the list. "Why this sudden viciousness?" she croaked. "If I've been self-centered, it's because I haven't wanted, or expected, anyone else to take care of me. I assume responsibility for myself. I deserve respect for that. At least I don't deserve petty shaming."

"That's been your shield, Julia, all these years. Look after yourself, and you'll be spared other people having to look at you at all. You've kept your life self-contained. Fine, nobody has gotten through to you, but the opposite's true, too. You haven't made a difference to anybody."

"My work's made a difference." She looked hard at the wall. "I've been useful."

"But not meaningful."

Julia glared balefully. "Not even to you?"

"Family is one thing. Outside your little circle formed by accident of birth, though—"

"Strange phrase to use: 'accident' of birth."

Margaret shuddered at a recent memory, but carried on. "Outside a few family members, it'll be as if you never existed. You can have oblivion, you can have meaninglessness, if you want it. For once, though, you might think of doing something other than efficiently preparing for death."

They stared in silence at each other, Julia's eyes hard with defiance, Margaret's soft with resignation. The chatter of monitors was the only sound for a long time.

"That's all I have to say," Margaret finally told Julia. "Glad you enjoy the flowers." She shuffled into the fluorescent brightness of the hallway, the weight of more than age pulling down her shoulders.

Dinner was solitary and quiet, as usual. Margaret worked at her computer afterward, catching up on notes to friends and updates about Julia to family.

She saved Susan for last. She was back in Michigan: Margaret had called the hotel to learn that. She deserved a note, some kind of reconciliation—but Margaret's long, blank stare at the monitor summoned no words. Her mind would not recant; she could not force her fingers to.

The phone jarred her out of a fugue. She picked up after three rings, and found Susan on the screen. Her eyelids were dry but raw, and she spoke raggedly.

"Mag, I was so hurt by what you said . . . then I kept thinking about it, and it hurt more . . . because I knew you were right."

A shudder racked her, doubling her over, almost out of view. Margaret nearly called out in alarm before Susan recovered. Her eyelids were dry no longer.

"How could I admit it? My genes, my cells, my age, all made into her. The clock inside her, the same as mine. How . . . why would I want to admit it? Poor Julia, rushing pell-mell into age, death . . . her body perfectly synchronized to break down the same time as mine. So fast . . . so fast. . . "

Margaret quietly watched her sister sob. No, the parallel wasn't perfect, their times not quite so foreordained—but what did such trivial facts mean in the face of the ultimate fear?

"I can't stand being alienated . . . left

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ignorant . . . we're more than mother and daughter, as close as people can be . . . we should be . . . so much time lost, lost, and all my fault. . . ."

Margaret felt tears welling up behind her eyes. She looked around desperately, finally snatching a napkin off the kitchen table just before she too broke.

Julia couldn't manage to refuse the wheelchair offered her, but did get Margaret to push it rather than Nurse Delgado. She had some standards of pride.

"I said I'd drive you home first, Margaret. Can't have you walking home, or waiting for some bus."

"I took a bus to your house to bring the car over. I can take another one back."

"A waste of your time." But Julia stopped arguing.

The front doors slid open for their party. Clouds floated overhead, a sheet of cotton picked apart at its edge. The sun hung beneath them, taking the chill out of the wind. Julia lifted herself out of the wheelchair, spasmed briefly with suppressed coughs, then stood erect. She leaned on Margaret, just with the fingers, disdaining support but desiring the balance. Her other arm cradled her bag, lumpy with clothes, books, and a flowerpot.

She spoke a few grateful words to Nurse Delgado as she returned inside with the wheelchair. "Not a bad day," she then said to Margaret, squinting to shade out the sun.

"Pretty good." They set off into the parking lot together. "Enough to make you glad you're alive."

"You never were subtle. I suppose that's for the best."

Margaret held back a smile: she could be a *little* subtle. "I am glad you made this decision, Julia. It's the right one."

"It's liable to get me killed. I'm liable to wish I'd never done it." She sighed slowly. "I don't expect it to help me, but if they learn something that can make life easier for other people like me, or even for average people, I guess it's worthwhile."

Margaret delicately moved closer, taking care not to throw off Julia's balance. "I'll be around for you."

"You'd better be. You got me into this, and I'm dragging you along with me."

Margaret didn't take Julia's attitude wrong. She understood the fear it masked.

They reached Julia's dull-silver car, just as Margaret's fingers found the envelope in her purse. "What's that?" Julia asked sharply.

"It's . . . from my sister. I printed it out from the e-mail she sent me, but it was meant for you." She saw the reaction she expected. "You don't have to take it, but I hope you will. She's . . . done a lot of soul-searching."

Julia's head shifted in an embryonic nod. "Your influence, I presume."

"Well, perhaps . . .

"Perhaps, nothing. She wouldn't shift an inch by herself." She entered the car, leaving Margaret to realize a moment too late that Julia intended on driving. "Are you getting in?"

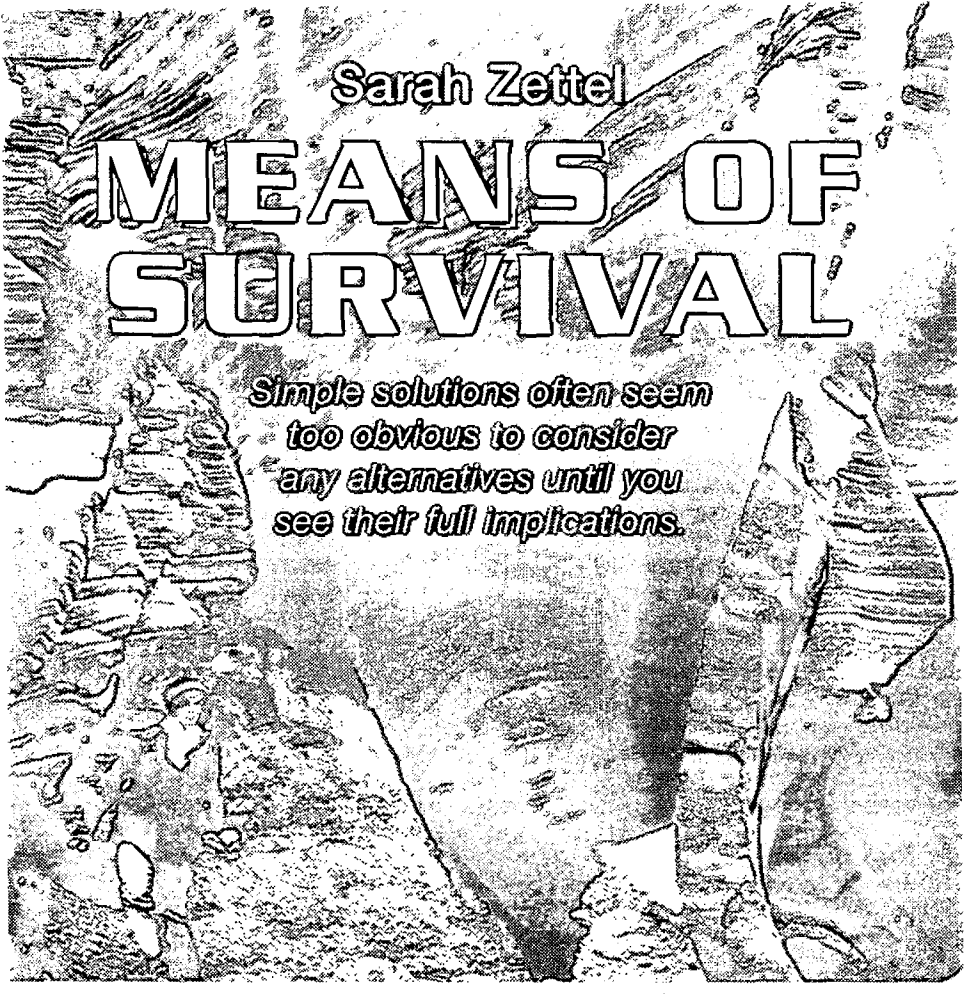
Margaret circled the car to enter the passenger's side. Once inside, she found Julia with her hand on the mirror, frozen in the act of adjustment. Her eyes were locked on the mirror, contemplating her reflection, her other self. It was a long time before she budged.

Julia took deliberate care strapping herself in, setting her bag just right between them, and starting the car. Then, as the engine hummed, with all the outward show of being an afterthought, she took the envelope from Margaret's hand and stuffed it into her bag.

Margaret said nothing. Best not to strain that pride. Besides, she trusted Julia to open it, eventually. If she was brave enough to offer herself to the telomerase researchers, she could surely read that letter.

She never doubted it for a moment. Like mother, like daughter.■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Sarah Zettel

MEANS OF SURVIVAL

Simple solutions often seem too obvious to consider any alternatives until you see their full implications.

The open society, the unrestricted access to knowledge, the unplanned and uninhibited association of men for its furtherance—these are what may make a vast, complex, ever growing, ever changing, ever more specialized and expert technological world, nevertheless, a world of human community.
—J. Robert Oppenheimer

"Target, eleven o'clock!" I pointed straight at the tell-tale shimmer in the winter air.

"Got it, Wanda!" Pauling slammed on the brakes, skidding the jeep and sending up plumes of snow and debris. Jones, Nikos and Lafferty leapt out of the back, bringing their guns to bear as they ran, forming a semi-circle around the shimmer. Base had picked up the incoming signal-burst five minutes ago. We'd barely had time to get here.

The shimmer turned into a slim man with clear brown skin. His black hair had gone almost completely grey. He had the dazed look all jumpers get. Then, his eyes focused on us and our guns. Fear froze him.

"Do you apply for citizenship?" I demanded.

His eyes widened a little, but he said nothing. I repeated myself in Spanish, then in French. He just stood there. I

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

glanced at Lafferty, and he glanced back at me. Damn. If we couldn't get him to understand, we'd have to shoot him.

I tried one more time, in Arabic, my last, sketchiest language. "Do you apply for citizenship?"

The man nodded frantically and babbled too fast for me to follow, but I did catch "citizen" and several affirmatives.

I let my breath out and but didn't lower my gun. "Search him."

Pauling and Jones slung their guns on their backs. While Nikos covered them, they grabbed the stranger and patted him down, none too gently. They tossed a small radio onto the ground, followed by a camera and a thin, black rectangle that might have been a notebook, or, more likely from the size of the thing, a notebook computer.

"What do you think you are?" Jones cuffed the stranger on the back of the head. "A tourist? Huh?"

"Hey!" I stepped in. "None of that. He's applying for citizenship, he's got rights." I turned to the stranger. He was shaking now, from cold or fear, or both. I met his wide eyes, and summoned up the Arabic version of The Speech I had memorized.

"You have applied for citizenship in the Deep Detroit protectorate. You are under our laws and our government. No powered communications devices may be carried, used, built, researched or taught without authorization. If you know of any other jumpers aiming for the protectorate, tell me now." I paused, but he said nothing. "If you are concealing any communications device, or knowledge of other jumpers, you will be shot. Do you understand?"

He nodded silently.

I let my face soften a little and dug up one of my few other phrases. "What's your name?"

"Ahmet Ahriamnah."

"Put Ahmet in the back," I said to Nikos in English. "Politely. I'll call it in."

I was the only one on our team with clearance to use a telephone. I opened the pack, fished out my keys and unlocked the steel box, undid the combination that released the receiver and dialed the number for base. From the corner of my eye, I saw Nikos take Ahmet by the arm and steer him to the jeep.

"Detroit Base. Name, rank and code," came the operator's bored voice.

"Wanda Douglas, Lieutenant, Welcome Wagon patrol twelve, A6-0512 Bravo. Hey, Macko," I added. "We got the jumper."

"Hey, Wanda," Macko now sounded a lot more awake. "They alone?"

"So far, yeah. Took some contraband off him." Lafferty, who had the team's computer clearance, and my oldest friend on the squad, started picking up the contraband and packing it into a cloth bag. "We're gonna need somebody who speaks Arabic at the debriefing."

"I'll let 'em know." Mack rang off just as Lafferty handed me the contraband bag. I locked it up in the phone box. "All right, Pauling, Jones, make camp. I'll have your relief out before dark." SOP. The jump site had to be watched for forty-eight hours, just to make sure nobody was going to follow Ahmet.

"Yes, Ma'am," said Pauling without any enthusiasm. Jones just slumped against a broken wall, pulled a lump of maple sugar out of his pocket, popped it into his mouth and began to suck on it. Jones was down to his last eight teeth, but he didn't seem to care.

Lafferty drove us back toward base at a more reasonable speed than we'd left it. He stuck to the best of the roads instead of careening us over the vacant lots. I stared out at the landscape: the rusting girders of the People Mover, the jagged remains of the Renaissance Center. Nobody had bothered to pretty the place up even after ten years of relative quiet, and I didn't suppose anybody ever would. Nobody lived on the surface anymore except Welcome Wagon and scavenger crews. It was too dangerous. You never knew who was going to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

jump in, or worse, who was going to try to jump you out.

Teleportation was the ultimate development of quantum technology. Somebody did enough work with paired particles and ghostlike-actions-at-a-distance and the new Certainty principles, to do what the sci-fi geeks had always dreamed of: take a chunk of matter and put it anywhere in the world. Boom. Instantaneous transport of anybody or anything within a hundred mile radius.

It got worse. Turns out teleportation was not only doable, but with the advanced state of satellite communications and computer tech, it turned out that teleportation was easy and cheap. With this extra development, some wise guy in the lab, I don't know who, but I wish I did so I could gun him down, decided that this was too big a deal for one lab, or one corporation, or one government to control.

So, he took the specs for the working model, the notes and the theories, and he dumped them out onto all five iterations of the Internet.

I have no idea how many people that move killed.

I watched the *Star Trek* reruns as a kid. I thought it was really great. Step onto a platform and tingle-whoosh-ping! You're somewhere else. But the *Star Trek* people were at peace. They didn't have crazy people who wanted to put a bomb on a platform and blow up their enemies. They didn't have people who figured out that if you could herd your enemies into a jump machine, you could make them all disappear.

Belfast. London. Serbia. Los Angeles. Jerusalem. Bagdad. Washington D.C. Moscow. Those were the first. The Hutus and the Tutsis were a little slow to get the news, but when they got it, they used it. The radicals in Quebec made sure Canada suffered with the rest of us. Then the supremacists, the separatists, the militias, the gangs, the mobs, the triads and the yakuza got their hands on it and that was the end of the U.S.A.

Detroit and its suburbs actually managed to survive. Mayor Danials acted on a piece of local trivia as soon as L.A. went off. Detroit is built on top of a whole network of salt mines. In the emergency messages the feds were letting out (while they were trying to keep any more bombs from getting into Congress), they said that solid rock seemed to block the jumps, but it had to be a lot of rock. By the time the feds fell, the Greater Detroit Metropolitan area had evacuated everybody they could down into those freshly-drained mines.

I remember the damp, the rotting algae and strangeness of the chlorine smell. I remember being pressed up against my mother in the darkness, hearing the sound of thousands of people breathing, crying, talking soft, talking loud, doing anything they could think of to try to keep from being afraid of the dark while above us, our world came to an abrupt end.

Eventually, lights got strung. Parties of ex-cops and ex-national guards began making forays into the ruins for food and materials. A treaty for food and livestock got struck with what was left of Windsor across the river.

Life started over, but life had new rules. The first of these was that nobody was ever going to be able to use information to destroy the world again. Computers were not salvaged, they were destroyed, along with telephones, televisions and radios. Except for a few authorized situations, information would move only as fast as people. People you could catch. People you could stop.

Some bright soul remembered the Henry Ford Technology Museum had working models of cars and forges and other machines that did not need computer chips to run. Some of the scavengers disappeared, but some made it back with information we needed. Steam boilers for heat and electricity, cars with chokes and throttles, steam pumps to get the water out of the new

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tunnels the John Henries were digging. There were lathes and machinists' tools, and Mayor Danials's quick thinking had saved a few old men who knew how to use them.

Lafferty took a hard left around a crumbling church and the Welcome Wagon base house came into view. It was little more than a concrete bunker over a really deep basement. Our new citizen would not have access to the residence tunnels until he'd been thoroughly debriefed and searched in far less pleasant ways than even Jones and Nikos could dream up. We were not about to give away shaft locations where somebody could jump something, or somebody, in on us. It's citizens or citizen applicants only in Greater Detroit now. Everybody else gets shot. Once, I think that would have bothered me. That was before the fires, before the disappearances, before the world died in front of me.

Inside the base, I motioned Ahmet to a chair, stoked up the fire in the oil-can stove and settled down behind my battered desk. I locked the phone pack in the floor safe. Then, with pen, ink and a few sheets of thick homemade paper, I began to write my report.

Before I'd filled up more than half a sheet, Lafferty pushed the door open to let in Captain Jacobs and four of his troops, two of whom had rifles and patched army-surplus jackets, and two of whom looked unarmed.

I got to my feet. So did Ahmet.

An unarmed woman surveyed Ahmet for a moment and in Arabic asked him to come with her. She gestured toward the cellar door. Ahmet looked at her hand, the door, and back to the rifles. Moving carefully, he started down the stairs. The rest of the team, except for Jacobs, followed. Jacobs turned to me.

"You said he had contraband?"

"Yeah, a few things." I unlocked the safe, and the phone box and pulled out the contraband bag. Jacobs scribbled a note on one of the papers and signed it. He untied the bag and shook the phone and camera out onto the desktop.

"The phone we can use. This . . ." He poked the camera. "It's not strictly contraband, but it might have a chip in it." He glanced up and saw me staring at the contraband on my desk. "Something wrong?"

I blinked hard and rubbed my eyes. "No, nothing. Just a long shift."

He nodded. "Your kid sister's down with the flu, isn't she?"

"Yeah."

He touched my shoulder. "I'll send your relief up early."

"Thanks, Captain." I sat back down and picked up my pen. He nodded again and headed for the basement.

I waited until he'd locked the door and the sound of his boots had faded away. Then, I put my pen down and went outside into the hard winter wind.

Lafferty was under the tarp shelter that served as a garage. The jeep's hood hid his head and shoulders. I walked up behind him. He was tightening something down and whistling through his teeth.

"Laff?" I said over his whistle and the frigid wind.

He turned, wrench in hand and his upper lip still raised. "Yeah, Wanda?"

"Where's the computer, Laff?"

His brow wrinkled. "What computer?"

"The palmtop we took off the jumper." I folded my arms. This was not happening. Laff and I had volunteered for wagon patrol together. We'd been on the same team for seven years, we'd gone to high school together before that, when there was a high school to go to. He was my link to the old world, and he knew the rules of the new one. He knew what we had to do to stay alive.

"Oh, that." He straightened up and tossed the wrench into the toolbox near by. "It wasn't a palmtop. It was a notebook. Pen and ink. I gave it to Jacobs's debriefers."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

He said it straight to my face. He didn't hedge, he didn't blink. Maybe I'd been mistaken. I hadn't looked that close.

But something way in the back of my head was sure it had seen a small, flat computer.

"Okay," I said. "As long as it's in official hands. But you should have given it straight to me."

Laff gave me a mock salute. "Next time, Patrol Leader. I promise."

I waved him off, went back inside and stared at my incomplete report.

The proper thing to do now was go down in the basement and ask Jacobs if Laff had given him a notepad. He'd say no, and I'd tell him what I'd seen. He'd go interrogate Laff, who'd either tell him the truth, or he wouldn't. Either way, on the basis of my evidence, Laff could end up shot. Stealing contraband on patrol got you shot. As his patrol leader, I might even have to pull the trigger.

On the other hand, Laff might be telling the truth. I closed my eyes and called up the sight of the contraband, dark against the snow and frozen clay. The missing thing was a black rectangle, maybe seven by four, and maybe half an inch thick. It could have been what Laff said it was.

Except Laff had never failed to hand over something that came off a jumper before.

I ran both hands through my hair as a wave of anger surged through me. Damn you! I thought toward Laff. How could you do this to me? I glowered at the door. I should go out there now and confront him. Could still save his hide from Jacobs, if not from me. . .

The door opened, and I started halfway to my feet, expecting Laff. I looked again, and it was Olive Day, my relief.

"Sorry," she said, yanking off her knitted hat and hanging it on one of the wall pegs. "Didn't mean to startle you."

"No, I was just getting up." I straightened all the way. Olive looked at me funny, but she just shrugged and hung up her duffle coat. "Thanks for coming in early."

"Beats sitting around down there," muttered Olive. Her Dad and husband had both died the week before. The flu was rolling like death on wheels through the tunnels, and we couldn't do a damn thing about it.

I laid a hand briefly on her shoulder and she covered it. "Hope your sister's better."

"Thanks." I told her about Pauling and Jones camping out as I bundled myself into my own coat and scarf.

The nearest entrance to DeepDetroit was under an old warehouse. The link fence and barbed wire were rusty, but the automatics and shotguns the guards carried were clean. I was challenged for form's sake and let pass.

The patchwork combination of metal ladders clamped to the walls and stairs carved into the stone took me down to the residential caverns.

My family had a spot in Tunnel 12—Deep Broadway. It was one of the original mines turned into living quarters. Its lighting was a little better and its floor a little smoother than most. Over the years, life had taken on a new shape down here. A family, a work cadre, or even a gang, would have a patch of floor near the wall, a little stone yard marked by stones, a shallow ditch, or a low fence of scavenged junk. In the wall behind them would be the family's sleeping niches; low bunks carved out of the living stone, big enough for two or three people and lined with blankets and paper. The public thoroughfare ran down the middle of the tunnel.

Men and women sat in their little territories, weaving on handlooms, knitting, carving wood, chiseling stone. Children chased each other in elaborate games of tag, laughing over the shrill voices of the community's grandparents warning them to mind the stoves, the yellow and white lights, the walls.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Here and there, someone worked on the walls themselves, carving out a fresh shape or a fresh saying. The walls had become works of art, relief carved with hundreds of images. Even under the mismatched collection of lights, there was a rough beauty to the place.

But over every other sound of living, you could hear the persistent coughing from the victims of the flu. It was a deep, dry, rattling cough that made your whole body shudder.

I followed the coughing until it became the dominant sound. Just outside the flimsy patchwork-metal wall barrier marked the current edge of the hospital zone waited boxes of masks and gloves scavenged out of the ruins of Henry Ford hospital. I covered my hands and face and walked through.

There weren't enough niches for everybody. The more recently sick lay on the floor. Family and friends, white-masked and white-gloved, crouched beside them, bathing their faces and trying to spoon soup down their throats. The place reeked of antiseptic and worry.

I tried not to see the new corpses wrapped in tattered sheets and ragged blankets lining the corridor waiting to be taken to the furnaces. I turned down the roughed-out side branch where my mother hunched next to Terry, my littlest sister.

"Hey, Mom," I pressed my cheek against her rough, dry cheek. The salt had worked itself into the lines on her face leaving permanent traces of white like scars against her skin. "Hey, Squirt." I patted the blanket over my sister's shoulder as I squatted down beside her.

Terry was awake today and she turned her face toward me. "Hey," she croaked, but the syllable dragged out a spasm of coughing. Then her face twisted. Mom, with a deftness born of far too much practice, shoved a stinking, battered basin under Terry's chin and let her vomit into it.

Without a word, I emptied the basin into one of the drains, trying not to see the blood in the bowl. Mom sponged off Terry's face. I gathered the soiled sheets and walked them down to the laundry, came back, relieved Mom on Terry-watch so she could go to the toilet.

I held my little sister's hand, feeling her thin, fine bones through my glove, and hearing the sick, wheezing noise her breathing had become.

Terry was nine. She was born down here. She'd never known my world, never would know anything even remotely like it. I tried to tell myself it didn't matter. The world she had was just fine. We were alive, weren't we? But in the dark where I lived alone instead of taking up one of the offers I'd had, I knew I didn't really believe that. The world was not fine. I couldn't make it fine.

And now, Terry was going to die and she was going to take Mom with her. And Lafferty was out there doing God knew what to upset what safety we had wrestled out of this broken world. Anger surged through me and I squeezed Terry's hand hard enough that a whimper escaped her. I loosened my grip immediately.

This is no good. Can't blame Laff for Terry being sick, but he's up to something, and there had better be an explanation for it.

Mom came back with two tin can mugs of hot tea. She held one out to me.

"Keep it for Terry," I said, getting to my feet. "I've got to go, Mom. I've got some patrol business to take care of." I pressed my cheek against hers again. "Love you."

"Be good, Wanda. Check in on your father." Her words were automatic. Her whole world was bound up in Terry now, and Terry was going to die.

I left as fast as I could.

Laff wasn't in his family's spot. His sister said he'd gone to the distribution center to see if there was any milk to be had. I tried the distribution cavern, but the milk dispensers said he'd been and gone.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I turned a corner and stopped to think. This was ridiculous. There wasn't anywhere to hide down here. The place was full-up with people. There were no disused tunnels or empty caverns. If you wanted to hide you needed to . . .

Go back up top.

I rubbed my eyes. This was nuts. This wasn't happening. I was just eating my heart out over Terry and so I was inventing something I could do something about. Laff would have a good chuckle about it, once he got over being pissed that I'd suspect him of breaking the law. I'd apologize and we'd spend a little time in the old downtown, seeing if we could find a stash of coffee the world had passed by.

But before that could happen, I had to find him. I went back to our spot, checked in on Dad and the boys, who were all getting ready for bed, grabbed my extra jacket and my big knife and headed out.

Up top, darkness had settled in. The moon blazed full and silver between the sparkling crystal stars. I tied my jacket up tighter as the cold, thin wind hit me.

"Hey, Wanda," said Tyler as I tramped through the gate. "What're you doin' out here?"

"Goin' for a walk, Tyler," I answered. "Can't stand it down there right now."

He grunted sympathetically. "Shouldn't let you out, though, it's not safe."

I punched him playfully on the shoulder. "I'm patrol, Tyler. I live up here."

"When you're on shift you do," he nodded at my shoulder, where my gun was not slung. "What you all are doing wandering around in the dark. . ."

I raised my eyebrows with what I hoped looked like innocent curiosity. "Somebody else come up here tonight?"

"Your boy, Lafferty," Tyler leaned against the wall. "He's out there scrounging cans of juice for the hospital. Said he can't stand being down there anymore either."

"Yeah, well, it's that kind of night," I dug my hands into my pockets. "Maybe I'll help him out. Did you see which way he went?"

Tyler jerked his chin up the ruined street. "Headed straight down old Woodward."

"Thanks, Tyler," I nodded. "I'll be back before shift's over."

"Better be," he grumbled. "Don't want to spend tonight tellin' your folks you got jumped out of here."

I headed down the cracked street with its dusting of snow and dirt. The wind carried off the the guards' voices, and I was left alone with the crunch of my footsteps and the whistles and moans that same wind teased from the abandoned buildings.

I kept walking. Moonlight turned the world black and white. Cold settled around me. It was a familiar sensation and I ignored it, wiping at my nose as it started to run. I strained my ears. I would never see Laff in the night's thick shadows, but I might just hear him.

Walking through the ruin, it was impossible not to remember this street as it had been when I was a kid, full of noise, light and life. I was going to Cass Tech High School. I was going to be a journalist, a Pulitzer-prize winner, a voice for change and justice. I was going to be so many things.

I wondered how he felt, the guy with the computer who had set loose the secrets of the jump machines and wiped it all out. I wondered if he was still alive, sheltered by frightened friends from the people like me who would take them all out to get to him, so I could say "You killed my sister, you bastard son of a bitch, you killed my mother. You killed my whole effing *world*!" before I took him out too.

A new sound shook me out of my thoughts. I stopped, listening with numbed ears. It was a low, rhythmic chunk-chunk-chunk. An engine, maybe a generator, out here where no one was authorized to have any power up and running.

At first I thought, what an idiot, to

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

have such a noisy machine running in the silence. Then, I realized that the night patrols were over in old Greek Town and down by the stadium right now, well out of earshot.

I turned toward the noise and slid into the shadows. In the summer I'd be worried about feral dogs and cats, and the rats that had forgotten to be afraid of us, but everything with sense had found shelter. Tonight, it was just me and that steady, rumbling sound.

A few wrong turns and a few blocks later, I found my noise. It was a generator. It rumbled next to an crude tarp tent beside Mr. Z's deli with its broken windows and sagging roof. A white light squeezed out from the crack between canvas and buckled pavement. I sidled closer, keeping my shadow off the canvas and heard the distinctive hiss of a Coleman lantern.

I swore inwardly. Those things were precious. It should be down in the caverns.

A rusting hot dog cart was parked next to the tent. I found a moment to admire the set-up. Rather than leave a room set up where anyone might stumble on it, this guy (Laff? Was it really Laff?) packed his contraband away in an innocuous cart that everybody knew would have been looted out years ago, so no one would bother if they chanced to stumble over it amid all the city's other junk.

Then, as I stood in the darkness, watching the clouds of my own breath swirl in front of me, I heard another sound.

Computer keys.

My doubts swallowed themselves. I felt for my knife. Behind me, a foot crunched on gravel. I whirled, crouching, with the knife out and ready. A silhouette stood in front of me. Beside it, a dog strained at its leash.

Dogs on patrol. Something we'd been thinking about instituting.

"Hey, Wanda," said Laff's voice behind me.

"Hey." I didn't look away from the silhouette and his dog. He stepped into the moonlight. Jacobs. Holy Christ. This was great. This was funny. If I'd done what I was supposed to and reported the missing notebook-thing to Jacobs, Jacobs would have said "Oh, yeah, I've got it," and I would have been satisfied. But I hadn't and now, here we were.

"Hey, Wanda," said Jacobs. "Cold night."

"Yeah." My fingers tightened around the knife's handle.

Jacobs sighed. "Wanda, believe me, there's nothing going on here that's going to endanger our people."

"So you say." I didn't relax.

"Tell her, Captain," said Laff. "She'll go for it."

"No," Jacobs didn't take his eyes off me. "No, I don't think she will. I think Wanda toes the line."

"Know what I think?" I asked softly.

He opened his mouth, and I charged, knife first. He dodged, like I knew he would, and I had a clear path into the night. I ran, head down, arms pumping. Behind me, the dog barked. Feet churned gravel and snow. I didn't look back.

Something grabbed me. I swung around. The dog, growling, had the hem of my jacket in his mouth. I sliced at its eyes. The dog yipped and backed off.

Something slammed against the back of my skull, knocking me flat. The world spun, and filtered away.

Blackout, I thought dizzily, but that wasn't quite it. I felt myself being dragged, I felt myself being hoisted. The world spun and I couldn't see, and then there was too much light and a high-pitched hum and more darkness. . .

Light exploded into my eyes and I was surrounded by warm, still air, and I knew. I'd been jumped.

"No!" I screamed and tried to scramble to my feet. I had a vague impression of rough wooden walls and bare fluo-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

rescent bulbs on the ceiling before dizziness took my balance and dropped me flat on the hard, smooth floor.

"Nice job, Captain," said Laff. "She's probably got a concussion." A blur knelt over me. "Hey, Wanda. Let me check your eyes."

"What happened?" demanded a strange woman's voice.

I tried to rise, tried to fight. I'd been jumped. Laff was in it, and Jacobs. Had to get back. Had to warn everybody. They'd give us away. Give us all away.

"Easy, Wanda, easy." Laff pressed me down. Pain filled my head and made my stomach curdle. Every movement made it worse. I wanted to die. I wanted to kill them all, but I couldn't move.

"Lafferty's compromised the mission," said Jacobs from overhead. Lafferty said nothing, he just pulled up one of my eyelids after the other. I could see nothing but blurs and blobs. "This is one of our Welcome Wagon leaders. She's an isolationist."

"She's concussed," said Lafferty. "And she's got a sister down with the flu."

What's going on? I hurt, I hurt, I hurt. Oh God, let me move. Let me get home!

"I don't care if she's the Queen of Sheba with an entire tribe at death's door," fumed the strange woman. "We are supposed to be a clandestine operation! What the hell are you going to say when somebody notices all three of you gone?"

I tried to lift my head. I managed for a second, and then my stomach heaved.

"Christ," muttered the woman. "Lafferty, clean her up and get her out of here. I have to report this."

Movement was a sickening space of pain. Finally something soft pressed against my back, and something damp pressed against my forehead. I thought of Terry and Mom.

It's the flu. I'm hallucinating. This'll all go away.

And for awhile, it did.

"Wanda? Come on, Wanda. Wake up. The doctor says you gotta wake up. . . ."

Dad? No. Lafferty. Memory came back in flood, along with the mother of all headaches.

I forced my eyes open. The walls around me were wood panels with pitch between the boards. I lay on a blanket pallet. Daylight poured through a glass window and fell on my hands, warming them. I turned my head gently, but it still hurt like hell. Lafferty sitting cross-legged next to me, leaning his back against the wall.

"How are you feeling?" Laff leaned forward. "You want a drink or anything?"

"I want an explanation you bastard traitor." My voice was shaky with pain and anger.

Laff sighed and hung his head, a gesture I knew so well. "Yeah, okay." He looked at me again. "It's pretty simple. Even after the worst of the chaos, the Internet never completely vanished. Some isolated nodes stayed active and a few of the satellites survived. Some people working them decided to try to put the world back together. They spread. They found me."

"You used the Internet!" I jerked my head up. Pain made my vision swim, but at least the room stayed steady. "You know the law, Lafferty! No information a human can't control!"

"It wasn't the knowledge that did us in, Wanda. . . ."

"No," I let my head fall back on the pillow. "Of course not. It was our ignorance, our fear, our weakness. Next time we'll know better." I grit my teeth and this time I sat all the way up. "Well, I've got news for you and your friends Lafferty, next time we're going to be just as dumb and just as scared and the knowledge will kill us just as dead!" My own voice pounded hard against my ears, but I kept going anyway. "We have got to control it, Laff. The universe is waiting out there to kill us as soon as we walk out into it. It'll get us if we let it in."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"There're things man wasn't meant to know?" he asked mildly.

"There're things man can't handle," I answered, pressing my hand against my forehead. "There're things too big, too dangerous and too fast for us. You were there, Laff. You saw it. You saw the people vanish. You saw the explosions. You heard about the people being shoved into the stations and getting jumped into nowhere."

"Yes, I was there," said Laff grimly. "And if we'd kept our heads . . ."

"But we didn't," I lay back down. The ceiling spun overhead. "When have we ever?"

"Wanda, listen to me," said Lafferty urgently. I closed my eyes. I wanted him to go away. I wanted to think. "Wanda, you've got to try to listen. There's a committee meeting right now to decide what to do with you. If I can say you'll at least think about the idea of reunification, they'll keep you here, just under house arrest until we can stabilize things back home. If I can't, you're going to get jumped out into as close to the middle of effing nowhere as they can send you and you're on your own. Try, Wanda. Try to see how it could be. The whole world back in touch. Civilization working together again. Think about the lives we could save, how we could rebuild our world."

I opened my mouth. I meant to lie, but I was too tired. "You're kidding yourself, Lafferty."

He sighed. "I guess I am." I heard him get up. "Somebody'll be in with some food and water."

I heard a door open and close, and the unmistakable click of a lock.

I waited for a moment, breathing deeply. Laff had been on the internet. Laff was trying to bring the world back into our home.

I let that thought pull me to my feet.

The room was about six feet by ten and empty except for me and the blanket pallet. I looked out the window. There was a winter field out there with a warehouse standing in the middle. People wearing machine-made clothes came and went with clipboards in their hands, or dragged handcarts loaded with wooden crates.

What do they think they're doing? I rubbed my forehead hard. *Who do they think they are?*

I felt through my pockets. Of course they had taken my fighting knife. They had also taken my jackknife and my keys.

I pressed my fingers against the windowpane and made a decision. Trying hard to keep my head still, I shook one of the blankets free from the pallet. I waited until the passers-by outside had all passed by. I held the blanket up against the glass. With my free hand, I punched the glass.

Pain shot up my fist and set off a fresh storm in my head. I bit down hard on my own lip and punched the glass again. I tasted blood and saw spots, but I also felt the glass shatter.

I lowered the blanket and used it to grip one of the glass shards and wriggle it free from the frame. It was a ragged, knife-edged triangle about six inches long. It'd do.

I unrolled my jacket sleeve until it covered my hand and gripped my weapon. My head pulsed. My stomach cried out alternately from hunger and nausea. My throat felt raw and hot.

I should have lied. I should have told him what he wanted to hear. I still could.

In as straight a line as I could manage, I walked toward the door to wait.

It didn't take long. The lock clicked. The door opened. I had a vague impression of white hands and brown overalls carrying a box and a bottle before I grabbed the man by the shoulders, slammed him up against the wall and shoved my glass knife against his throat. He stared at me with wide, terrified brown eyes.

"How do I get to the jump station from here?" My vision swam, but I

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

pressed the shard closer, just in case he thought I wasn't kidding.

"Little concrete building, straight across the yard. It's locked," he gurgled.

"You got a key?"

"No." I let the shard prick his skin. The blood trickled fresh and red down his windburned throat. "Yes."

"Give it to me."

He fumbled in his pocket with one hand and brought out a single key. "Put it in my pocket," I ordered. He did. My head hurt. My stomach ached. I felt as weak as water. I should kill him. He was going to kill my family, take my whole world away again.

I kneed him in the groin, he doubled over, and I bashed the bottle of water he brought me down on the back of his head.

I locked the door behind me and walked as briskly as I could manage across the yard. Nobody paid much attention. *Guess they're used to newcomers.*

"Hey!" shouted somebody. My nerve broke and I ran. The ground rolled and pitched under me, but I kept my feet. Hands snatched at me, but I slashed out with my shard, tearing skin and muscle. My free hand fumbled for the key and found it.

I slammed up against the jump station door. I shoved the key into the lock. The whine and ricochet of gunfire sounded around me, just as the door opened and I ducked inside.

It was a bare-walled room, empty, except for the jump platform with its sparkling mesh cage, a control console that looked like it had been wired together out of two dozen salvaged systems, and a woman with gold skin and black hair, halfway out of a folding chair.

I stumbled toward the woman and all but fell into her arms. She caught me reflexively, and I grabbed her arm in return, thrusting the glass shard against her long neck.

"You're going to set those controls and jump me home," I rasped. "And you'd better do it right, because I'm taking you with me, you understand?"

I felt her shake, saw the fear take charge of her, but I held her tight even though I felt my own strength slipping away.

"If you're going to do this," said Lafferty, "at least take this with you."

I swung around, using the woman as a shield. Lafferty stepped through a doorway, and closed the door behind himself. He held out a wooden box, about ten inches on a side and three inches thick.

I stared.

"It's antivirals," he said, walking slowly forward. "There's directions for cultivating more. Ahmet says the Detroit cavemers have the tech to manage just fine, if they can get the seed solution." My gaze lifted to his face. "Ahmet's one of ours. Before the Bad Times, he was with Doctors without Borders. He got a look at the flu. Jacobs and I were sending him back with samples when you found us."

He was only a foot away now, still holding out the box. "Come on, Wanda. You can save your sister. If you move it, you can save everybody. I'll send you home myself."

I looked into his eyes for a long time. He didn't flinch, didn't even blink. I took my arm from around the woman's and she scrambled away. I took the box.

"Tony. . ." said the woman.

"No, Gina." Laff said firmly and he sat down behind the console. "Hurry, Wanda, before somebody comes to stop me."

I got onto the platform. We looked at each other and fifteen years of friendship passed between us without a single word. He truly believed what he'd told me, and I knew that with all my soul. He'd do just what he said now, and I knew that too.

Laff dropped his gaze and clicked a few keys.

The room went away, and the street next to Mr. Z's deli and the tent and the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

rusty hot dog cart came back in the full light of day.

I stood but my balance wavered. I started walking, primarily because if I stood still, I'd fall over. I had no direction. My knees shook. I blinked hard, trying to clear my vision without success.

An engine's roar cut through my confusion and over it, I heard a familiar voice. "Wanda! Christ, Wanda!"

Nikos.

The next thing I knew, a jeep skidded up to me and Pauling, Nikos and Jones piled out.

"Jesus Christ, Wanda, where've you been? We've had search parties out. What's that?"

It took me a moment to remember the box clutched in my fingers. "I, uh, antivirals." I said. "For the flu. Jacobs and Laff thought they found a cache. We went down after it. There was a cave-in. . . . They're gone. Dead, I mean."

It was a stupid story. Nobody could possibly believe it. But they did. They bundled me back home and down to the hospital caverns. The doctors took the box. The medics took charge of me. They laid me down beside Terry with instructions to Mom that I wasn't to sleep more than four hours at a time, and I wasn't to move at all. Mom got up, moved over two feet to sit between us and gave us each one of her strong, salt-dried hands.

A week later, I went out at night again. Terry was back in our family spot, sleeping in our niche. The hospital was all but cleared out. Hundreds saved, alive and warm and back with their families. Terry was still painfully thin, but she was laughing instead of coughing, and my mother had remembered how to smile.

I walked down Woodward under the stars. The Moon had waned to half, but there was still enough light to find the rusting cart. The tent was gone, but its canvas had been hung over the empty deli window.

Have to step up patrols, I thought, as I lifted the corner of the canvas and stepped over the low windowsill. *It's criminal that nobody found this.*

Inside, resting on a couple of cinder blocks sat a relic from my childhood; a computer monitor and keyboard. The CPU in an insulating blanket sat next to them. I noticed it was on battery power now. The give-away generator was gone. They'd been back here, Lafferty and company. They'd been busy. That meant there was a jump station near here we hadn't found either.

The monitor screen was black with glowing white letters. I walked up to it and read one word.

WANDA?

I knelt down. My sister lived. My mother lived. I lived. So did Lafferty, and his people. So did a world of people who knew things. Knew things, new things. Dangerous things, saving things. Who knew too much and not enough. Who could kill us. Who could save us.

Slowly, my heart in my mouth, I touched the keys and picked out the words WHO ARE YOU?

One heartbeat later came back the word; FRIENDS.

Oh God, I prayed to the night and the world, *let it be true.*

With shaking hands, I began to type.■

Correction

On p. 96 of our February 1999 issue, the art for "Nor a Lender Be" was attributed to Darryl Elliott. The artwork was actually created by Beryl Bush. We apologize to Ms. Bush for the mistake.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

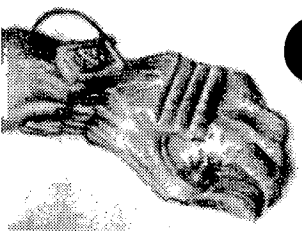
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

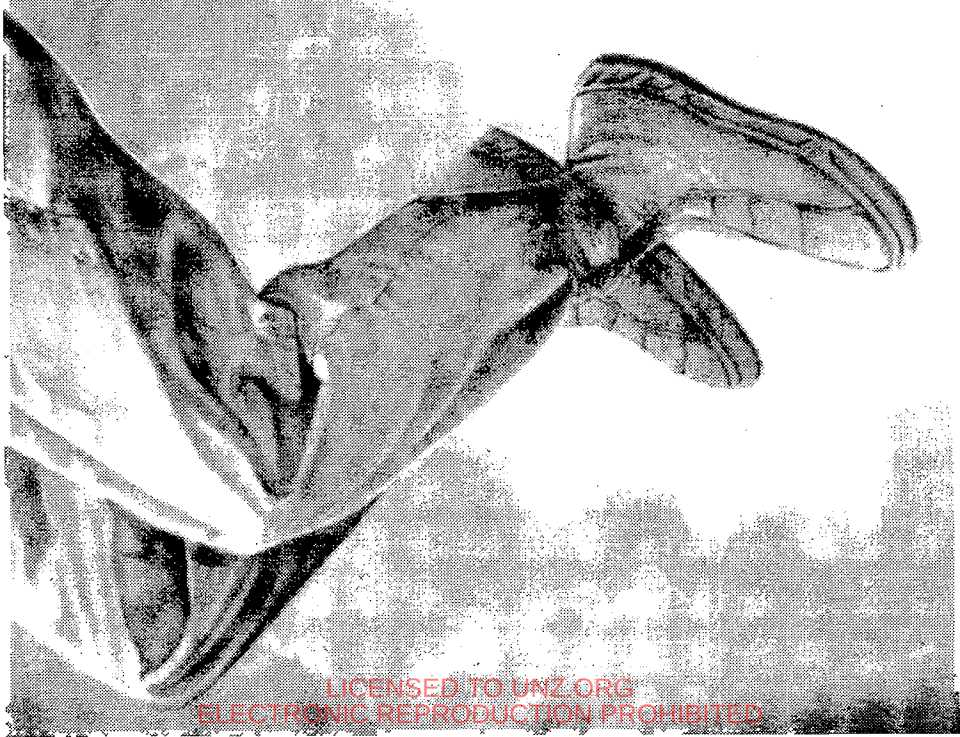
Rick Cook

THE HOST OF THE AIR

Some things are irresistible at a certain age, and later outgrown. But sometimes they can't stay that way. . . .

Illustration by Darryl Elliott





LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The sky was clear.

I shaded my eyes and stared east into New Mexico. Nothing but a perfect pale-blue dome with a wispy frosting of white.

Below the sky, the land lay hot and still. Mesas in red and tan and purple thrust out of the red-tan desert, all dotted with darker juniper and pinon. The breeze was gentle but my skin tightened as the hot, dry air sucked out my moisture from me.

The trucks roared and bellowed up the grade, taking a shortcut between interstates, and the cars swished past, carrying tourists from one scenic spot to another.

Squinting hard I could make out a single tiny dot drifting through the sky. No detail at this distance, but you didn't need it. Nothing in nature flew in quite that way.

But no storms. Not today, not tomorrow and probably not the day after.

I went back into the Angel's Rest, letting the door bang behind me. In the cool dimness Del had some stupid country song on the radio about a woman crying in her beer. A trucker and a couple of tourists were eating mechanically and Carol was leaning against the back counter watching them.

"Monsoon's late," I said to Del where he was sitting at the counter.

His wide brown face was impassive. "Rain's in its own time."

I came back to my own coffee cup. "Angels are already swarming."

"They're in their own time too."

I grunted and reopened my newspaper. It wasn't a new conversation.

The door banged again and a woman and kid walked in.

The kid came first. He was a teenager, gangly, skinny and sullen. The woman was obviously his mother, slender, frosted hair and skin that wasn't quite young any more. The kid blinked in the dimness. His mother took off her sunglasses.

Then the world stopped.

"Roz?"

She turned, frowned at me and then her face opened up in recognition. "Bob?"

We hugged and then stepped back as propriety reasserted itself. I let go of her hands and dropped mine to my sides.

"It's just so good to see you again."

"It's good to see you."

Her eyes were the same blue, with just a few wrinkles around them to give them character. Her hair was cut short and frosted instead of shoulder length and brown, but she was as trim as ever.

"Where's the bathroom?" the kid demanded.

Roz didn't quite blush. "Oh this is my son, Jason."

"How do you do, Jason?"

"Finewheresthebathroom?"

"Through there and to the left." I jerked my thumb without taking my eyes off her.

"Kids," she said with a nervous little smile.

"Yeah," I said, guiding her to a booth. "But what about you?"

She slid into the booth and shrugged at the same time. "Oh the usual, I guess. Got married, got settled, had a kid, got unsettled, got unmarried." A smile, fake-bright. "And here I am."

"I'm sorry," I said, not meaning it. "You're looking good."

"And you?"

I smiled and spread my hands. "I manage this place."

"When did you stop? Flying, I mean."

I knew what she meant. "Couple, three years ago. Just got to be too much."

The door banged again and a couple of fliers walked in, man and a woman. Not even cherubs, just daytrippers. Their belts were lightweight and their clothes were upscale sporting style. I ignored them, but Roz all but glared as the man helped the woman off with her belt and hung it on the rack next to his.

"This isn't a good place if you don't like fliers," I said mildly. "Not at this time of the year."

"I'm sorry. I didn't mean to be obvious."

"Why?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

She sighed. "Oh Jason. He's going through a phase where all he thinks about are Angels."

"Then why'd you bring him here?"

She pursed her lips. "He was going to come anyway. He made that clear. So I thought it was better if he came with me instead of alone. This is his reward for finishing the school year."

I nodded and wondered what she'd promise him to get him to go back next fall.

"Well, you're early. The monsoon's late so it's going to be three-four days before the Host gathers."

"We've got two weeks."

For the first time I was glad the monsoon was late.

"Can I get you something to eat?"

She smiled. She still had a wonderful smile. "Thank you. I'd like that."

We had just ordered when Jason came out of the bathroom and slouched down with us. I called Carol back and he added his order to ours. Then we made small talk and reminisced while the kid fidgeted. Mostly it was nothing and about nothing much. I concentrated on her face and let the conversation carry along as the old electricity slowly rebuilt between us. Then she said something that stuck out sharp as a cactus spine.

"So," Roz was saying, "when Jason turned fifteen last June . . ."

Fifteen? That would be the year after Roz and I . . .

I stopped, cup halfway to my mouth. Yeah, the timing would be about right. I looked at the kid out of the corner of my eye but he mostly looked like Roz.

I tried to remember what that spring had been like. I could recall the times easily enough, but not much of the emotion. I'd been down since the fall, mostly going through the motions of school and waiting for summer and the freedom of the air. We'd laughed a lot, made love a few times and I used to walk her home from her waitress job. I guess we had been in love too.

I tried to remember what the breakup had been like, but there wasn't any breakup, not really. Just summer came and with it the end of school and the warm weather. I headed out, following the clouds. I didn't come back that fall.

I called a couple of times, awkward conversations full of pauses that showed us both how far apart we'd become. But mostly she'd drifted away like a dream, like the rest of my life before I became an Angel.

Roz apparently felt this was getting too intense because she shifted her attention to her son.

"Oh Jason, I heard something on the news today about antigravity generators."

"It's not antigravity," the kid growled. "It's the Kormann Effect."

"Well, anyway some company in California has a unit in the labs with high-temperature semiconductors that can lift five hundred pounds."

Wrong thing to say to a wannabe angel.

"That's all right," I told him. "When I was your age they had some in the labs that could lift four hundred pounds. As long as you can't bring two units together without exploding we're pretty well stuck."

Jason concentrated on his chicken-fried steak. "It keeps flying pure."

Purely useless he meant. As a practical matter, Kormann units were limited to a little less than two hundred pounds. Given the limits there wasn't much you could do with the Kormann Effect. There were a few other things, lifts and such. But mostly it was confined to flying belts—and you better not fly too close.

"You don't understand," he said looking at his mother. "That's what I like about it," he went on. "The purity and the freedom. Just you and the clouds.

And a lot of other things you don't want to know about, kid.

Casually, deliberately, I turned so the light caught the scars on the side of my neck. When you don't want to come down and you're not overconcerned about your safety there's a maneuver you

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

can perform to recharge in the air. It involves flying close to a thunderstorm trailing a wire. It's called "Tickling the Dragon's Tail" and sometimes the dragon bites.

The kid stopped suddenly. "You were an Angel, weren't you?"

"Yeah, I flew."

He was determined to be unimpressed. "A crock, huh?"

"Yeah. A crock."

"Hey Mom, if I rig the dish can I watch television?" Roz nodded and he got up at sauntered out.

"He's at that age." Roslyn said as the door banged behind him.

I nodded and said nothing. I'd just met the kid and I felt I understood him better than his mother did—or wanted to.

We sat and we talked and drank coffee while the customers drifted in an out and the trucks roared and bellowed up the grade outside. Or mostly she talked and I listened. Aside from flying, not much had happened to me since we parted, and flying was a touchy subject with her. Just concentrating on watching her and feeling her watch me. I honestly didn't realize how long we sat there until the neon lights outside clicked on with a buzz.

"I'd better go check on Jason," Roz said as the neon cast a hot red glow over her face.

"You could come back to my place and watch television. Maybe have a drink."

"I'd like the drink, but unless you've got DBS Jason will probably pass on the television."

"That's too bad," I said with utter insincerity.

There was a dusty pickup with a cab-over camper parked in the motel's RV lot.

"Part of the divorce settlement," she explained. "It was that or the red sports car."

"You always looked good in red."

A little smile. "Not very practical. Anyway you're full up and we were lucky to get an RV hookup." She stopped. "What are you looking at?"

"The light in your hair."

"It must make me look like a hag."

"Not hardly." Then I had her in my arms and I was kissing her and she was kissing me back.

"Well," she said a little breathlessly as we broke the clinch, "I'd better go see about Jason. And maybe get a few things."

When Jason joined us for breakfast the next morning, I had obviously been promoted from "old-and-not-very-interesting-acquaintance-of-mom" to "mother's new boyfriend." Jason actually smiled at me. We made small talk all through breakfast while Roz and I maintained the proprieties. Then she excused herself, something about the RV hookups, and left Jason and I sitting across the table from each other.

"What's it like to be an Angel?" he asked suddenly. "To never come down?"

Shit. How can you answer a question like that?

Drifting along at five hundred feet. So late at night all the world is asleep beneath you. Low enough to hear the barking of an occasional dog, perhaps roused by the scent of your passing. So low you can smell the odors and feel the temperature change as the earth changes beneath you. The swimming pool and woodsmoke odor of suburban backyards in the summer, the lush scent and surge of cool air from a newly mown field. The chill of a lake. Here and there a pool of light, more in the cities where the greenish-white and warm pink of streetlights cuts the land into squares and rectangles, with occasional porchlights or windows for contrast.

Float higher. The sounds and smells fade away and the lights flatten to pinpricks, forming an elaborate patterned tapestry in the dark below. Now there is only you. The sound of your breathing becomes important, and the wind past your ears and the occasional creak of your harness. You are all there is. Everything else is reduced to blackness and that almost meaningful pattern of lights suspended below your feet.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Sometimes when the moon is full and the clouds blanket the earth, you soar in that enchanted land between moon and clouds. The world below you becomes rolling fields and towering cliffs with black bottomless chasms showing little stars of light in their depths.

"Exhilarating. Scary. Sometimes boring."

He obviously didn't believe the last. "What's the longest you were ever up?"

"Oh, three . . . four months." Sounded good but who the hell really remembers? You get your food on the wing, or from a fly-through. Your drink is rain water. Then bombs-away through the open crotch zipper and when you get so foul you can't stand it you find a warm rain shower. For the rest you just fly.

"Did you ever make the Grand Tour?" He meant to follow the sun to the tropics and then around the world on the winds.

"A couple of times." Three actually. Twice on the Southern Route near the equator and once on the Northern Trace.

"How did you navigate? I got a friend who says it's GPS. I say no way. To be an Angel you gotta be able to read the stars."

"Mostly you don't. Navigate, that is. You go where the wind takes you. The continents are hard to miss."

"Yeah, but what about out over the Pacific? The Southern Route?"

"You get lucky. Or you get hungry. And sometimes you get wet."

How the hell do you explain the subtleties of reading the winds and cloud? How you can look at the wave patterns on the ocean and see where they'd reflected off land hundreds of miles away. To know that that *configuration of clouds means there's land underneath, and that other one just means a cool spot in the ocean? I'm not even sure you can put it into words. But you learn fast. Angels who aren't observant don't last long.*

Or you go down over the Sea of Japan trailing smoke and sparks, like Jerry Alvarado. Or you come down in the middle of the Great Australian Desert and you have to walk three days to reach a sheep station. Or . . . or a lot of things.

There was a muffled burst of sound outside as a daytripper settled in with the stereo on his belt still going. Jason sneered as he flicked off the music and the dust began to settle.

"Don't like country and western?" I asked mildly.

"A goddamn stereo," he said contemptuously. "That's not pure flying." He lowered his voice as the daytripper came through the door. "Hell, he's even got heaters on that thing."

"More comfortable."

"So? You gotta hold the weight down. All those toys rob weight and power, and the weight usually comes at the expense of the power pack. So you trade time in the air for this other stuff. You gotta keep it pure."

This from a fifteen-year-old who had maybe two hundred hours in the air.

"Well, you're probably right."

He missed the irony completely.

"Do you still have your belt?"

"Yeah."

"What kind is it?"

"It started as Marine Raider issue."

"My friend Kwame has a Cloudsplitter XM-9, well his dad does. And I fly with it a lot."

There's the windup. "Um hmm." I took another sip of lukewarm coffee.

"Uh, could I borrow yours sometime? just for flying around here, I mean? I'll be careful."

"No."

"Why not?"

"First because no one has ever flown that belt but me. Second, it's been customized all to hell and gone. The thrusters have been re-angled, the lifters have been cut down and the power control circuitry's got a manual override. It doesn't handle like a stock belt and you'd be upside down in the air before you knew it."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Hey, I can fly!"

"And," I went on as if he hadn't spoken, "your mother would kill me. The answer is no."

"But . . ."

"And I want you to promise me that you'll never touch that belt." I locked eyes with him. "Promise?"

"Yeah," he looked away. "I promise."

Then he tried a new tack. "Owning this place, I mean living around here, you must do a lot of monsoon flying." He meant flying around the massive storm cells that built up over the desert in late summer.

"Someone else owns the place, I just manage it."

"But you still get to do a lot of flying, right?"

"Not that much." The truth was I hadn't had the belt out of closet in my trailer for a couple of years.

"What's it like, fighting these desert storms?"

"You don't fight a storm. You blend with it."

"Control it, huh?"

I cocked an eyebrow. "How much rough weather flying have you done?"

"Enough," he said, stung. "We used to sneak out when there was a storm coming."

Yeah, I thought, *and stay up until the Air Police caught you and ordered you back to your safe suburban homes, well before the main cells arrived.*

"Let me tell you something. You don't control a storm and you don't fight it. You work with it. That's how you get your ride."

"The real Angels control the storms," he shot back. "The Archangels."

I thought about telling him how wrong he was, about how being an Archangel had less to do with flying than appearances. *Damn, he's got a knack for getting under your skin.* I began to see what Roz was up against.

"How about you, Del?" Jason called over to the grill. "Do you fly?"

"Nope," Del said, without looking up.

"Flying's not a big thing with the local tribes."

He looked shocked, like hearing someone who lived on a perfect surfing beach confessing he didn't surf.

"Why not?"

"Doesn't fit for them."

"You mean they're like my aunt Becky? She thinks flying's against the will of God."

I shrugged.

"Hey Del," he called over the counter, "what do Indians think of flying?"

"I don't know," Del said, deadpan. "I never asked them." He let it sink in for a beat. Hopi humor tends to be awfully dry. "I can tell you what my great-uncle says though," Del went on. "He thinks flying belts are the logical extension of the bahana world. Cause bahanas are all crazy and they've got no roots, no real contact with the earth. So . . . ," he shrugged and went back to scraping the grill.

Jason shook his head in rank incomprehension.

"He's got a point," I told him. "Flying serious means giving up an awful lot of things. It's probably not worth it."

"You did it."

That was a stumper. "That doesn't make it a good idea. I got nothing out of it." Nothing except freedom. *Nothing except the exhilaration of the skies.*

"Now you sound like Mom. She keeps ragging on me about school and shit." He looked up at me disingenuously. "Maybe you could talk to her about it. You know, since you were an angel and all." He held my eyes for just the right amount of time. Give him that, kid had the routine down perfectly. I wondered how many of Roz's boyfriends he had used it on.

I let him get his hopes up a little. "I could," I said finally, "but I won't."

"Why not?"

"Two reasons. First it wouldn't do any good. Second, she's right."

"Next you're gonna tell me I've gotta

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

learn this crap so I can make something of my life when I outgrow wanting to fly, right?"

"Wrong. I'm telling you you're gonna need that crap if you want to fly."

He opened his mouth but I cut him off. "Look, there's a hell of a lot more to being an Angel than strapping on a belt. The ones who try it that way don't last long."

"So? An Angel's supposed to die in the air, isn't he?"

God! To be fifteen and immortal again. "An Angel's supposed to know what he's doing. Otherwise he not only doesn't have much fun for the little while he lives, he gets laughed out of the Host."

"So what's he gotta know?"

"For one thing he's got to know his belt. For another he's got to be able to read wind and weather. An Angel had damn well better know geography and a couple of foreign languages don't hurt either."

"Yeah, but you can pick that up flying. There's no math and stuff."

I grinned utterly without humor. "Wanna bet? Ever do a wind triangle in your head? Did you know that power pack discharge is logrithmic? You know what that means when you're trying to balance speed against air time to make your next charging point?"

He frowned. "That doesn't sound very free."

"Freedom's an expensive commodity." I leaned across the table. "Look, people have got some pretty dumb ideas about Angels and what it means to fly. They see the glamour but don't see what goes into it. We encourage them because it gives us this big romantic image. But we laugh at them too."

He sat there for a minute, turning it over in his mind. I could see he didn't like it, especially the part about being laughed at. But I could see he understood the logic too.

"Clouds are picking up," he said finally.

I'd made my point and didn't press it. "We'll probably get our first good storms tomorrow night."

That night with Roz in my arms I dreamed about flying again.

Now! Up and away in a gentle rush with the ground falling beneath you. First only head high, as if you had suddenly grown ten feet tall. Then the roofs and the haphazard tops of things become more important than their planned facades. Now soaring above the power poles and you can see for blocks in all directions. Start to drift, either on the wind on by a wind of your own making. Floating away over the houses and streets, over the rooftops. Looking down at your feet hanging in air until the soles of your feet begin to tingle in anticipation of the landing shock that never comes.

First what is beneath you, the "ground" dwindles into "land" and then the "land" becomes "earth." Imperceptibly they merge into each other as you climb. The details disappear and the patterns emerge, getting broader and grander the higher you go.

Then the scene shifted, the way dreams do. Now I was south of Fiji with the clouds billowing up around me. There was a taste of moisture in the air and a hint of the scent of tropical flowers. There was warm afternoon sun to tint the clouds gold. There was . . .

There was someone above and ahead of me, a dark speck against the pearl-golden clouds angling into the wind so her long blonde hair streamed out behind her. I knew. I knew what she was and more than anything I wanted to turn and run with all the power in my thrusters. Instead I flew toward her, propelled by the blind power of the dream. I dropped beneath her and swooped up, closer than ever. I tried to shut my eyes, I tried to scream but nothing came out. I dropped down, zoomed up and . . .

"Bob wake up!" And I was back in the bedroom in the trailer with the air conditioner going and a truck bellowing up the slope outside.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I looked at her, wide-eyed and panting.

"You were screaming," she said. Her eyes were wide too.

"Yeah." I sucked in another deep breath. "Yeah, I was having a nightmare."

Roz put her arms around me and held me close until I finally stopped shaking.

"Want to tell me about it?" she asked gently.

"It was something that happened out over the Pacific. I was flying along and I spotted another angel, the way you can pick someone out against a cloud bank, you know. I got closer and saw it was a woman. A woman with long blonde hair. So I figured I'd come up and say howdy."

I took a deep shuddery breath and went on. "There's an etiquette for that, you know. But I was going to be a smart-ass and surprise her by popping up in front of her."

Roz nodded, wide-eyed.

"So I stayed behind her and then I dove under her and swooped up in front, facing her and moving backward."

Moving with my back to the clouds and my eyes fixed on Hell.

"Her face was a rotting horror. The eyes long gone and the hair hanging to the shreds of flesh on her scalp. The teeth grinning perfect and pearly in the mass of corruption. I screamed and power dove away, my shoulder brushing the foul leg of her jumpsuit.

"Even then I didn't touch the ground."

"Jesus," Roslyn said softly and hugged her knees under the covers.

"I don't know who she was or what killed her. Lightning, exposure, anoxia from going too high. Even another Angel." *But whatever got her had left her to cruise the sky until the her power pack ran out. Drifting like some errant member of the Wild Hunt with her long blonde hair streaming behind her as a banner in the wind.*

She put her hand on my arm. "Was that when you decided to quit flying?"

"Somewhere along in there."

When had I decided? Or had I even made a conscious decision? Had I just floated back down to earth in the same way I had floated away in the first place?

Roz obviously felt the subject needed changing.

"I wanted to thank you for whatever you said to Jason."

"Oh?"

"He told me he's going to stay in school next year. He said it was some things you said to him."

I rolled over to look at her. "Roz, he's going to leave eventually."

"I know," she said, staring at the ceiling. "They always do, even if they don't go flying off. But he's so young still."

"Way too young," I agreed.

She propped herself up on one elbow and looked at me. "He likes you. You're good for him."

I reached out to caress the line of her jaw. "Hell, it's the least I can do."

Suddenly she was very still. "Why do you say that?"

"Well . . ." It hung there. Then I let my breath out in an explosive sigh and went on. "I mean he is my son."

"What?" She propped herself up on one elbow to look me in the face.

"He's the right age and everything."

"Bob, he's not your son. I would never have done that. Not with you. Even when you were there, you weren't *there*," she added in a smaller voice. "You just floated in and floated out."

"Oh."

"How could you possibly think . . ."

"I dunno. I just got the idea, okay? Now let's leave it." I turned away from her in the bed and listened to her not sleeping.

There was definitely a storm brewing the next morning. The change in pressure just made me feel worse, like the time I'd gotten drunk on Colombian sugar-cane gin and ridden a pressure wave off the Andes to nearly twenty thousand feet feet. No, I decided, as I washed

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

down my Alka-Seltzer with my first cup of coffee, maybe this was worse.

The door banged in a way that made my head throb.

"Hey Bob." It was Jason, all bright and chipper the way only a kid can be at seven-thirty in the morning. Just now I wasn't in the mood for chipper. Or bright either.

"How's it going?" he asked as he slid onto the stool next to me.

I grunted and hoped he'd take the hint. No such luck.

"You know, I've been thinking about what you said yesterday." I didn't say anything so he plunged on. "And I think I am going to stay in school. That will give me time to get a real belt and fit it out for serious flying. Then, in two or three years, when I go out, I'll be able to do the Grand Tour for my launching flight."

I still didn't say anything.

"What do you think?"

I thought I was sick, I was tired, and I sure as hell didn't feel like coddling this kid any more. Besides I owed him the truth—for Roz's sake, even if he wasn't mine.

"I think you'd kill yourself," I said. "The truth is you'd be lucky to make the Rockies going east. You'd sure as hell never make Hawaii if you went west."

"But you said . . ."

"No," I cut him off. "I never said that at all. You thought that and I just didn't correct you." I smiled, without any warmth. "Angels never do. That's how we protect that reputation. We let people believe this whole crock about what serious flying is like." *Freedom? Hell, kid. You'd be freerer working nine to five at some bank.*

"Hey, I can fly . . . seriously."

"It's not about flying. It's about surviving. It's about pitting everything you've got against winds and weather and terrain that don't give a damn. Hell, that actively want to kill you. Daytrippers mosey along, smelling the daisies. If you want to fly serious you gotta get serious. Serious flying takes judgement and you just don't have it. Maybe in four or five years, maybe never. But right now you're an accident looking to happen."

He went quiet, kind of folded in on himself, but I kept pushing it.

"Now," I went on, "you wanna fly serious, the first thing you gotta do is figure the odds real close."

"That's not how it works! That's not what riding the thunder is about."

I snorted. "You really don't get it, do you? Riding the thunder isn't about how brave you are. Brave only gets you killed quicker and nobody gives you points for that. It's about how smart you are. How good you can judge conditions. You don't ride the thunder for bravery or for kicks. Not very often."

He stuck his chin out. "What about the rush?"

"The rush comes when you're safe out of the storm cell and you can look back on how close you cut it and survived."

I was peeling big chunks off his dreams, leaving raw places exposed to the stinging air. But maybe that way he wouldn't wind up like the woman in my nightmares. Or maybe he would, but no one was going to accuse me of encouraging him.

He opened his mouth, closed it, and then he slid off the stool and made for the door. I sipped my coffee and concentrated on not moving my head.

The place filled up quickly. Now that the storms were arriving, the tourists were flooding in as well. The truckers were lost in the cheerful babble and clatter of plates and silverware as Middle America stoked up on carbohydrates before heading out to observe the quaint native customs. The belt rack was full too, as another slice of Middle America stopped by before heading out to try to convince themselves that they were one with those quaint natives. Del was hopping behind the counter, Carol was swivel-hipping through the crowd balancing plates of food. Me, I just sat

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

there, tried to shut out the racket and waited until my head stopped hurting.

I wasn't even aware of Roz until she touched my shoulder.

"Bob, have you seen Jason?"

"Not for an hour or so."

"He's not in the camper."

I shrugged, trying to cover the awkwardness of last night. "Maybe he's out watching the clouds."

Roz shook her head. "Del, have you seen Jason?"

Del turned from the grill but before he could answer a daytripper came storming up to the counter.

"My belt's missing," he announced loudly to Del.

I looked at Roz and she looked back, wide-eyed.

"It's a brand new Cloud Dancer XLR," the daytripper went on turning to face the cafe. "I left it in the rack and now it's gone."

"How long ago was that?" I asked.

"Not forty-five minutes. Jesus, I come all this way . . ." but I wasn't listening.

"Kid was in here again maybe half an hour ago," Del said quietly.

"Oh my God," Roz breathed. "He'll hurt himself."

"If he stole my belt I'll kill him!" the daytripper said.

I left Del to handle the citizen and Roz and I made a quick search. As expected it turned up nothing.

"Look," I said as we walked back to the diner, "the kid's not going to get into trouble. The belt probably doesn't have a full charge and . . . "

"It was fully charged," Roz said quietly. "I heard the owner say so."

I did a quick calculation. The XLR has decent endurance, enough to reach a thunderhead from here. But it's a lightweight piece of shit that can't fly out of slope thermal. Trying to ride the thunder with one would be like trying to land a whale on five-pound fishing line. Suicide.

We walked on in silence, our shoes crunching on the red cinder soil.

"Bob," Roz said quietly. "What did you say to him?"

"What makes you think I said anything?"

She stopped dead and looked at me. "What did you say?"

"I told him the truth. That being an angel isn't what he thinks it is."

"And what else?"

"I told him he doesn't have what it takes to be an angel and he may never have what it takes."

"Oh, mother of God! So he steals a belt and he goes out to prove you're wrong."

"I thought you'd be happy I tried to talk him out of it."

"By telling him something guaranteed to send him over the edge? Goddamn it, don't you realize how important your opinion is to him?"

Truthfully, I thought Jason didn't much care what I thought, but I wasn't going to say that.

"Hey, look . . ." I put my hand on her shoulder but she shook it off fiercely.

"You're mad at me so you take it out on a fifteen-year-old boy. You send him out to kill himself because he's not your son."

"I . . ."

"Oh, save it!" She ran back toward the diner and left me standing there feeling like a total, dishonest shit.

She was still in the diner a few minutes later when I walked in, talking to someone on the pay phone with her back to me.

"I called the sheriff," Del said when I got close to the counter. "They're going to start a search with the tribal police and the highway patrol, spread the word to the daytrippers."

I knew how much that was worth, but I nodded anyway. How the hell can you find one kid out among all the hundreds or thousands of fliers spread out over a quarter of a million square miles?

"The belt's owner?"

"He's staying in a motel in Tuba City. He said he'll report it to the cops there."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Bob."

I turned around and there was Roz. Her mascara was streaked and her eyes were puffy but her voice was level.

"Bob, will you do something for me?"

"What?" I asked warily.

"Will you find Jason? Before it's too late?"

"He's going to be fine, Roz. He'll probably run the power pack out before the thunderheads form up this afternoon."

"Will you?" she repeated, like I'd never spoken. Like I could find the kid by waving a magic wand or something.

"Well, I'll be glad to help, but you've got to understand there's a lot of territory to cover and we don't even know where to begin looking."

"I see," she said in a small, dead voice. "Well, thanks," and with that she turned and walked away.

I sighed and turned to Del, looking for some comfort. But he just looked back deadpan and went back to the grill.

All the seats at the counter were taken, so I got a cup of coffee and stood over by the wall where I could look out at the clouds that were starting to form. At least I'd been smart enough not to tell the truth twice in one day.

Damn it! It didn't matter what I did. I'd join the search, but I'd just be one more body. There was too much sky to cover and if the kid really wanted to kill himself, he'd be gone before anyone found him. I couldn't change that, in spite of the ugly little voice deep down inside me that kept saying I really had meant to hurt Jason with what I told him.

I told the voice to go to hell a couple of times and then concentrated on staring out the window. Roz crossed the corner of my vision once or twice as she carried things from my trailer back to the pickup. I tried to keep my attention on the clouds and the building weather pattern.

Finally, I put down the nearly full cup of coffee and went out the back way to my trailer.

My belt was just where I had left it, in the closet off the hall. Jason had promised me he wouldn't touch it and he hadn't. Somehow that made me feel worse.

I hefted the strangely unfamiliar weight and horsed it out of the closet and down the narrow hall to the living room. A quick check showed the charge was full, the thrusters were adjusted just the way I left them. The straps and the harness were as sound as the day I put them away, although I didn't remember the olive-drab webbing being so faded and stained. My flight suit was folded away in the bottom drawer where I'd left it, and I fitted into it, smelling the cedar and tugging a little at some places where it was unfamiliarly tight.

I slung the belt over my shoulder and stepped out onto the red cinder desert. A quick flip and both arms were the harness. Then a couple of minutes of adjusting straps and fitting the headphone for the radio receiver, and I was ready.

I stepped away from the trailer, maybe fifty feet and checked overhead for power lines. There weren't any of course, but old habits die hard. Then I started feeding power to the lifters. The static tingling built up and the tips of my hair separated as the field grew, kicking up little eddies of red dust around me. One more check and I gave more power to the lifters. Then the straps tightened and there was the hollow feeling on the soles of my feet as the ground fell away and I was flying.

I fed a little power to the thrusters to compensate for the breeze and rose higher. Now I was looking down on the roof of my trailer. A little higher and I was above the roof of the diner. I could see Roz's truck still in the parking lot, but no sign of Roz. Then I turned west and north and left the complex behind me, still climbing into the warm air.

Finding the Host when it's swarming isn't really difficult, but it isn't the easiest thing in the world either. The Host

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

likes to form someplace to discourage daytrippers and even cherubs, if they can. It took me the rest of the morning and the better part of the afternoon to find where they had swarmed. They were on top of a mass of puffy, billowing clouds that hadn't decided whether to form a thunderhead or not.

From a distance they looked like a flock of vultures against the blinding whiteness of the cloud bank. They made a huge swarming dance perhaps half a mile high and nearly that wide. A buzzing, whirling confusion of bodies soaring and zooming and writhing in acrobatic frenzy. All of them showing off for each other and themselves and for the sheer joy of flying. Later, as the thunderheads built up toward evening, they'd separate, seeking out clouds in little groups of three or four to continue their dance in the face of the storm cells.

I came in about level with the center of the Host, riding the little ups and downs of the air currents in the approved angel fashion rather than fighting them like a daytripper. Good manners called for joining the dance at the periphery and maybe working your way in slowly. I didn't have time for good manners so I was going to have to do this the hard way.

As I bored straight in the first of the angels moved to intercept me. One of them came in a long, deceptively easy arc designed to make me break off. I held my course until I felt the first tingle of field interference and then a pulse from my lateral thrusters moved me out of his way. The next one moved in more slowly, coming from the side and trying to force me toward a temporary concentration of cloud dancers. I broke to the side, first toward him and then, at the last minute, straight up.

By now more of the Host had noticed me and come to join in the game. They'd play me one-on-one but it wouldn't be a fair competition. Each time our belt fields interpenetrated it loaded the lift generators. If I wasn't careful mine would overheat, or even fail catastrophically. So I had to not only dodge the human bullets that came at me from all directions, but give my belt a chance to recover before the next encounter.

So I dodged and I twisted and I pulsed my thrusters and rolled past my guards like the ball handler in some insane three-D basketball game. And sometimes I ended up a little closer to the heart of the swarm and sometimes a little further out, but I was closer more than I was further.

My temperature gauge was into the yellow by the time I came up against the last two bodyguards. I tried to dodge both of them, but they got me in a squeeze with one on either side. A little too aggressively. Rather than adding lift, which is the expected move, I cut power and dropped straight down. The pair nearly collided with each other and spun off in a wild tangle of arms and legs as they fought for control and separation.

The Archangel was sitting in lotus position, hanging in the air at the very center of the swarm. He gave just a little nod to acknowledge my skill.

He wasn't much to look at. He was dirty, ragged and his legs were atrophied to matchsticks. His hair and beard were a wild gray tangle. That didn't matter. He was the baddest of the bad, the angel of the angels in this host. This one boasted he hadn't touched the ground in seven years and never would again alive. He was the one I had come to see. The one I had to convince.

"I want to talk to you," I said from just out of interference range.

The old man gestured. "Air's free. So talk." Around us the mad dance continued.

"There's a kid out there with a stolen flying belt. I need your swarm's help to find him."

"Your belt?" Behind me one of the dancers tittered.

"The kid's a friend. He's gonna hurt himself if he's not found."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"If he's a friend why are you trying to control him?"

"Look. He's gonna die if we don't find him."

"In the air? That's the way to go, isn't it?" A little more laughter behind me, louder. At least one of the voices was the silvery peal of a woman.

"But . . ."

"My ears hurt," the archangel proclaimed and spun on his axis so he was facing away from me.

The host made a lane for me as I left. I didn't know if it was a gesture of respect or irony.

Well, so much for that. I wondered what I'd really expected. Part of me wasn't surprised, part of me was disappointed and part of me was, well, mad.

But that was stupid. I knew Angels and it was as stupid to be mad at them for acting like Angels as it was to be mad at a thunderhead for acting like a thunderhead—or a kid for acting like a kid.

Maybe that was the difference.

Okay, back to plan B. Only there wasn't any plan B. So what now?

So what the hell? I was a fool who had gone on a fool's errand. Roz had cleared out by now, so I could go back to the trailer in peace.

To the west, the clouds were boiling up, pearly gold against the Kodachrome blue sky. They swept forward in echelons, each trailing a dark patch of shadow along below. Soon the cloud bottoms would darken and then the rain would start, with lightning illuminating the inside of the thunderhead like a Chinese lantern, forking from cloud to cloud and licking out to touch the earth.

Here and there the land was dotted with the dark shadows of clouds, moving over the earth as the winds moved the clouds above them. I scanned the big puffy clouds for 270 degrees and the line of thunderheads forming up to the west to sweep over us. There would be thunder to ride tonight at last. I felt the old, familiar pull. But faint and weak, like a memory that wasn't really part of me.

Bloody hell, I thought, *what am I? What's left of me now?* For the first time I knew, really knew, I wasn't an Angel any more and that made me very sad.

The logical thing to do was to head back to the Angel's Rest. I'd done what I'd promised. Hell, I'd gone beyond that, on a fools errand that would make me a joke to that host for years to come. There wasn't anything more I could do.

Now where the hell would I go if I was a smart-ass fifteen-year-old out to prove something? Not that that was much of a stretch, I realized.

He'd probably be too eager and too dumb to wait for the clouds to come to him. He'd go looking for them. He wouldn't be smart about it, either. He'd head straight for the nearest thunderhead, bucking the headwinds all the way. He wouldn't know enough to circle around and get the wind at his back, or even to tack. He'd just set his thrusters and go. He'd probably stop along the way to play with the belt and do a little cloud dancing. That would buy me even more time.

And it was still stupid. There were too many thunderheads and too many hundreds of square miles to search. Even if he was heading for the closest group of cells, I still didn't know which one of them. A human being is awfully small against a twenty-five thousand-foot cloud column with a base four miles across.

Without even thinking about it, I set course for the nearest group of forming thunderheads.

It was late afternoon by the time I reached them. The cloud cell was still forming, so there was no rain. But even without the rain it's goddamn cold at twelve thousand feet, and the side effects of the forming storm made for a bumpy ride. I'd lost weight or something in the time I'd been down, and the crotch straps were rubbing me with every jounce. There was also something

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

about the power curve that was a little off too. Maybe I hadn't kept the belt in as good a shape as I thought, or maybe I was out of practice. Mostly I ignored the effects and tried to concentrate on scanning the skies. Once or twice I saw someone drifting toward the clouds, but from the easy, confident way they rode they were obviously angels.

As I got closer, the clouds got bigger and blacker, boiling up to neck-craning height with the tops churning and roiled from the forces within. The winds got stronger too as the forming thunderhead swept hot air from the desert floor into its base to replace the air boiling out at the top.

A heat engine—two miles across and at least five miles high. But an unruly engine held together by the laws of thermodynamics as the parts clashed and roiled against each other.

TV to the contrary, nobody rides the center of a thunderstorm—not intentionally and never twice. In there are winds of over a hundred miles an hour blowing up, down, and sideways, but generally up. If the stresses didn't get you, the anoxia and hypothermia at thirty thousand feet would when the cloud finally spit you out. It might play with you for an hour or more before that happened, kicking you in all directions and twisting you several ways at once. I'd seen someone who'd gotten swept into the center of a thunderstorm cell. Every joint in his body was dislocated.

No, you get your ride around the edges of the cell. The winds are strong and tricky, but easier to read. You wait for a favorable configuration and them jump on for your elevator ride to heaven. The trick is to ride the elevator only partway up and to jump off at your floor.

The other trick is to look in the right way. I had a pair of binoculars in one of my knee pockets, but I didn't bother with them. Instead I sort of unfocused my eyes and tried to take in the entire cloud formation at once. Or not the entire cloud, just the bottom third and sort of around the edges. If Jason was higher or deeper than that, there wasn't anything I could do for him.

I scanned the clouds, trying to think of all the dumb, romantic stunts that will get you killed if you try them. I didn't spend much time looking in the right places, the safe places out of the downdrafts and side cells where angels hung out while they calculated their rides. Instead I concentrated on the places that were close—the crevices and clefts in the cloudscape that looked so inviting to explore and could suck you in an kill you in a heartbeat.

Sometimes you have more luck than any human being deserves. There he was above me, close to the ugly black of the main cell and hanging limp. He was bobbing gently upward. A quick glance at the clouds around him told me he was on the outside of one of the convective cells hived off by the storm. He wasn't in immediate danger, but if he didn't break out of the air currents before the cell topped out he'd be sucked into the base of the thunderhead with the air he was riding.

Probably for at least the second time, I realized. He wasn't flying, he was just hanging in his harness, body slack and toes pointing toward the earth.

I yelled at him, but I could barely hear my own voice against the wind. The figure in the flying belt didn't stir.

A quick glance at the clouds and I put maximum power to my thrusters, killing even my stability system to get more lift. I shot up so fast my cheeks sagged and the crotch straps dug into my inner thighs. I zoomed past him in a climb that kept me out of the reach of the worst of the currents. I watched him slide past me at perhaps a thousand feet and then dwindle beneath me as I angled in as close to the cell as I dared.

Then I reached down and switched off the belt.

Instantly the pull on my shoulders vanished and the harness went sicken-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ing slack. I spread-eagled for stability and then I dove into the mass headfirst.

The wind whistled in my ears, the heavy air buffeted me and the kid grew at frightening speed, but I was moving too fast for the cell to play with. I steered with my arms and legs until I was coming straight at him, barrelling down on him like a runaway freight train. Then at the last minute I flicked my belt on and off again.

The surge of the thrusters slowed me, but I still slammed into Jason so hard it knocked the breath out of me. I groped at his harness with numb fingers until I hit the switch and we were both falling free.

I used a couple of karabiners to clip his harness to mine before I powered up my belt again. By now we were out of the cell and into more-or-less clear air under the thunderhead. But Jason's skin was like ice and he hung limp against me. A couple of fingers to his jugular told me he still had a pulse, but he was so cold he wasn't even shivering.

The nearest hospital was in Tuba City, to the west and into the a headwind. Instead I angled away, heading slightly east and running for the highway. At worst I could flag down a trucker and have him call for an ambulance.

I didn't have to. Sitting about where I expected it, at the bottom of a long hill next to a patch of juniper, was a white car with big black numbers on the roof.

The highway patrolman was young, intent and Indian. If having two guys on a flying belt swoop down next to him was unusual, he sure didn't show it.

I damn near collapsed as soon as I touched down. "Kid's name is Jason Carter," I had to brace myself on the fender to stay upright. "Runaway. Tried to ride a storm."

The cop took Jason from me. "What's wrong with him?"

"Exposure mostly." I turned around and sank to the ground with my back to the car for support. "Get him to a hospital. And tell his mom, okay?"

By now Jason was wrapped in a blanket and stuffed into the back seat of the cruiser.

"How about you?" the cop asked.

"I'm okay," I gasped and staggered upright. "I'm going home."

I rose into the air and watched the cop's red-and-blue lights shrink into the distance. Probably could have watched him all the way to Tuba City if I'd wanted to, but I turned and headed the other way, back to the diner.

Off to the north and west, the lightning flashed, lighting the cloudscape and the ground and leaving a purple afterimage burned into my eyes. The Host would be in full swarm now, with Angels dancing in and out of clouds for a hundred miles along the front. I turned away from the show and bore a little to the south, to take advantage of the wind.

Tomorrow I'd go to the hospital and see how Jason was. Maybe I'd see Roz there and maybe we'd talk. Maybe. Tonight I was limp as a worn rag, shaking from cold and exhaustion, and I just wanted to go home.

I put power to the thrusters and felt the warm wind in my face. From the taste of the air I knew we'd have rain here before midnight, but I'd be snug inside by them. Below me on the highway the occasional car raced along, some of them going faster than I was. Up ahead I could pick out the tiny cluster of lights that was Angel's Rest. I watched as they grew bigger and more distinct. Behind me the lightning was walking horizon to horizon as the line of storm cells swept forward.

I floated down toward the diner as the twilight softened into darkness. The mercury light in the parking lot bathed the cars and trucks in a harsh greenish glare. But the back door was open, casting a warm yellow pool on the stoop and garbage cans. Del had the radio cranked up and somewhere far, far away a woman sang of love lost and kindly remembered.

Angel voices
Calling me home. □

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

THE REFERENCE LIBRARY Tom Easton

Vast, Linda Nagata, Bantam, $5.99, 405 pp. (ISBN: 0-553-57630-5).

Starfarers, Poul Anderson, TOR, $25.95, 383 pp. (ISBN: 0-312-86037-4).

Tea From an Empty Cup, Pat Cadigan, TOR, $22.95, 254 pp. (ISBN: 0-312-86665-8).

Full Tide of Night, J. R. Dunn, Avon, $14, 312 pp. (ISBN: 0-380-97434-7).

Scent of Magic, Andre Norton, Avon, $23, 361 pp. (ISBN: 0-380-97687-0).

Cold Tomorrows, Bruce Boston, Gothic Press (4998 Perkins Road, Baton Rouge, LA 70808-3043), $6 ppd, 35 pp. (ISBN: 0-913045-07-1).

Immortality: How Science Is Extending Your Life Span—and Changing the World, Ben Bova, Avon, $24, 283 + xvi pp. (ISBN: 0-380-97518-1).

The Magical Maze: Seeing the World through Mathematical Eyes, Ian Stewart, Wiley, $24.95, 268 + xiv pp. (ISBN: 0-471-19297-X).

The Hugo, Nebula and World Fantasy Awards, Howard DeVore, Advent:Publishers, Inc. (P. O. Box A3228, Chicago, IL 60690), $14, 332 pp. (ISBN: 0-911682-32-5).

One of the unexpected features of last July's Readercon was the presence of videographer Eric Solstein and his crew. Solstein was taping interviews with writers and critics—Hal Clement, Gene Wolfe, Barry Longyear, John Clute, myself, and others—for "The Possible Future," described as "a documentary history in four parts" intended to illuminate "the Twentieth Century's most dynamic literary genre, Science Fiction, with special attention to how it has shaped and reflected the consciousness of modern times." The goal is a quartet of programs that Solstein expects to air on PBS on the birth of the genre, the Golden Age, SF after The Bomb, and modern SF. Advisors are David Hartwell, Samuel R. Delany, and Jim Frenkel, and copies of all interviews will be archived at the Center for Science Fiction Studies at the University of Kansas and the Science Fiction Foundation in the UK. Soon to be interviewed are Samuel R. Delany, Fred Pohl, and Joe Haldeman, among others.

This is an interesting project and one well worth supporting. In particular, if you have "relevant film and videotaped source materials, for which rights may be available [or loanable], and collections of pulp magazines, hardcover & paperback first editions, and original art that can be borrowed for photography" Solstein would love to hear from you at Digital Media Zone, 129 W. 27th St., 4th Floor, New York, NY 10001 (digmez@earthlink.net).

Linda Nagata impressed me greatly with her first two nanotech novels, *The Bohr Maker* (reviewed here in September 1995) and *Tech-Heaven* (reviewed May 1996). The publisher never sent me a review copy of her third, *Deception Well*, but here is its sequel, **Vast**, and it has a great deal to recommend it.

Despite the passage of centuries, one of the major characters is Nikko, who in *Bohr Maker* had been designed to live in vacuum. As the immortal master of the starship *Null Boundary*, he can dissolve his body away at will, live for a time in the ship's memory banks, recon-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

struct himself, and edit his memory and moods, all thanks to a nanotechnology that seems like magic. He has survived the explosion of humanity into the galaxy; the arrival of the cult virus from space to Earth, the conversion of Earth's humanity into something like a fanatic hive mind and then its destruction (*vide* Dunn's *Full Tide of Night*, below); and the appearance of ancient warships, the Chenzeme (something like Saberhagen's Berserkers) to destroy human colonies.

In *Deception Well*, Nikko apparently learned that the particles of dust that made up a nebular cloud held Chenzeme memories, recipes for Chenzeme technology such as the "philosopher cells" that cover their hulls and decide action, and altered recipes that aimed to change the Chenzeme agenda from attack to cooperate. When he left, his ship wore a patch of philosopher cells, and he had with him (among others) Lot, infected by the cult virus, driven to spread its communion, and able to communicate with those cells. He also had a mission, to track the Chenzeme ships to their source.

Now one of those ships is shadowing them, approaching, threatening destruction. Lot uses the philosopher cells to pose as Chenzeme and *Null Boundary* is mated instead. The resulting infusion of alien nanotech threatens to destroy the ship but they manage to burn off the damage in a close pass by a star. They are left with a souped-up drive and mysteries ahead.

What do they find? A cloud whose people are safe from the Chenzeme but not from the cult virus. Structures—or maybe creatures—that appear to be the virus's source. Hints that the virus and the Chenzeme warships are the remnants of two factions in a very long-ago war. Victory, and apotheosis.

Nagata's nanotech has become a kind of biology. People and their machines blend and blur, much as the cells that gave rise to our kind of life did billions of years ago. Spaceships contain components made by humans and Chenzeme, and indeed their crews are as much parts as independent beings. Nagata's vision broadens our sense of who we are and what we might one day become as few others have done before her.

Recommended.

In **Starfarers**, Poul Anderson paints a very poignant portrait of the future. The basic idea is simple: Not too long from now, the search for extraterrestrial intelligence succeeds, not because anyone detects radio signals but because astronomers spot the wakes of distant starships and know thereby that we are not alone. From this mite, physicists deduce that it is possible to tap the energy of the vacuum and soon develop a device to do so. Now humans too have starships, and an age of exploration opens.

But we're not talking faster-than-light travel here. It's all relativistic, meaning that starship crews experience months of voyage-time but come home to find that many years have passed. Not suprisingly, the crews develop a sense of clannishness; eventually they become known as the Kith.

And those distant starships remain, thousands of light years away, thousands of years beyond the grasp even of those who are used to the effects of time dilation. Yet there are always a few ultimate dreamers. The *Envoy* is built. Ten volunteers—men and women, dreamers and romantics, a troublemaker who keeps whining, "Can we go home now?" and a poor fellow who follows, ever yearning, the woman who will not have him—are found. And they are off, led by Captain Ricardo Nansen.

Their first discovery is that over time those distant wakes diminish, as if the civilizations that generated them were dying, or growing tired and giving up. Meanwhile, back on Earth, the Kith ripen as a breed apart from the rest of humanity. History proceeds, bound by the end of the tale to add fourteen thou-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sand years to its recorded span, and the Kith are more and more seen as alien, to be despised and persecuted. Humanity draws inward, perhaps, hints Anderson, much as those other, distant kinds have done. Perhaps starfaring is just a phase for a civilization to go through.

Is it? That's a sad thought for Anderson, and surely for most *Analog* readers as well. Look with him and the crew of the *Envoy* at what is left of those starfarers who first showed humans starfaring was possible: they're there, yes, but hunkered down, served by robots and nanotechnology, stable, safe, all adventure and excitement put behind them, all new ideas avoided for fear of their destabilizing effect.

Meanwhile, back home, the Kith dwindle. Earth too draws inward, as do its colonies (though some are well behind in the process).

And the *Envoy*, a mutiny put down, its crew diminished, is finally coming home laden with new ideas, new technologies, and the promise of endless new adventures. What reception will they find? Will starfaring revive? Or will humanity, like the alien Tahirians, be content to sit on the front porch and rock for the rest of eternity?

If that last sentence, by the way, makes you think of Clifford D. Simak, it should. I found Anderson's prose here frequently evocative of Simak's, perhaps because of the poignant, wistful tone. His characters, on the other hand, were despite romances, rebellions, and yearnings stiffly subordinated to the sweep of history that dominates his point. Yet that point is quite sufficient to earn *Starfarers* a strong recommendation. (Note that part appeared as "The Tale of the Cat" in the February 1998 *Analog*.)

Pat Cadigan's last novel was *Fools*, in which a technology of memory transfer permitted memory theft and even a kind of mental parasitism. With her latest, **Tea From an Empty Cup**, she demonstrates that even though the technology with which she plays may change, her basic concern with exploitation of the innermost self remains.

Here the technology is that of "artificial" (aka "virtual") reality, maximized by the use of "hotsuits" for stimulating the whole body's nerve endings. Just as today (when all most of us can use is a keyboard, mouse, and monitor), people enter the computerized world, assume identities, and play hard. Just as now, an assumed identity can be badly mistreated. Just as now, the effect of the mistreatment is strictly psychological. There are no physical injuries, no bodies on the floor.

Except . . . Now there's a body. Peel off the hotsuit and helmet, and there it is, throat cut, DOA after a visit to post-Apocalyptic Noo Yawk Sitty. Identity: Tomoyuki Iguchi, aka Shantih Love, real name only his mother knows. What killed him? Gameplayer's stigmata, meaning the real body mirrors an AR blow? Maybe for a bruise, but for a cut throat? "Come on!" says police detective Dore Konstantin. "You say there have been six more deaths like this?" And she's off into Lala-land to find out what really happened.

Now meet Yuki. She's hunting for Tomoyuki, but she falls in with Joy Flower, a disreputable woman who recruits young studs for unknown purposes. Some of those studs are never seen again. Now Yuki is her assistant, donning a high-end hotsuit, diving into AR, and discovering that her skin itches as if someone else is wearing her just as if she were a hotsuit herself. It is a very frustrating sensation.

Remember Cadigan's concern with exploitation of the innermost self. Memory, in *Fools*. Now it's identity, in the sense of labels and personae in AR, where you just can't tell who hides behind any mask. And even the body itself, or its AR representation, becomes just another stealable mask.

Life gets confusing, doesn't it? But there's more to the world she has de-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

vised here. Japan has been destroyed by earthquakes, but fragments remain as enclaves in both the real and artificial worlds, and there is supposedly a movement afoot to recreate the real old Japan as a very special place in AR. We get a hint of this in Chapter 1, when an unnamed Japanese guy peddles a package of passwords and drugs to an equally unnamed white guy. The package smells a bit like a maguffin, and so of course it turns out to be after a good deal of highly entertaining and very readable charging around.

So how did the kid die? This is the story's biggest weakness. The answer, when it finally comes, definitely provokes one of those "Waaiit a minnit!" moments. But by then you're having too much fun to quit, and you wish there were a lot more than ten pages left.

You can count on Cadigan.

J. R. Dunn well earned his plaudits for *This Side of Judgment* (reviewed here in February 1995) and—especially—*Days of Cain* (reviewed here in February 1998).

Full Tide of Night, "inspired by John Webster's [post-Shakespearean] immortal revenge tragedy *The Duchess of Malfi*," is better than either of his previous novels. Dunn remains, as in *Days of Cain* (which considered whether it was possible to undo the Holocaust), concerned with the inevitability of human monstrosity. Sometime in the next century, computer hackers will become the Erinye, the ancient Furies, the tormentors of humanity. Masters of virtual reality, they will strive to become masters of the real world too, and they will have a host of tricks that enable them to take over computers, artificial intelligences, and even human beings. By the time they are detected, it will be too late: only Julia Amalfi, last of those who fight the takeover, will survive by fleeing in a starship loaded with embryos, databases, and an infant AI named Cariola. She finds Midgard, a chilly world, and there begins the task of recreating humanity. Fortunately, she was treated long before with Earth's technologies to prolong life. A century later, she is still present, the Lady Amalfi, presiding over a world that seems to be humming along quite nicely.

But as always there is a worm in the apple. Her minions have not kept her up to speed on discontent, economic inequity, and the appearance of assorted cults. And now the rebels are at the gates, one portion of them militant idealists and farmer soldiers, another a collectivist cult, the Rigorists, that is based on all the worst thoughts of Lenin, Stalin, Pol Pot, and Mao. Among other things, the Rigs want to put Lady Amalfi on "trial" for crimes against the General Will.

Meanwhile, Cariola is convinced that Lady Amalfi has lied to her about the past and is helping the rebels. A starship is approaching from Earth, claiming the Erinye are gone but sounding far, far too deceptive to Lady Amalfi's suspicious mind. The trial proceeds, featuring trumped-up charges and orchestrated testimony. Tony Perin, the young leader of the farmer soldiers, has learned that dissidents—including those who give other than Rig-approved (Rigged, of course) testimony—are brutally purged, and he does not like what looks imminent. Fortunately, Tony is a talented leader, quite comparable to Napoleon and Alexander, and he is able to make good use of his resources.

The imagery is of the Visigoths versus Rome, savagery versus civilization, and the comparison is not at all kind to communists, socialists, terrorists, vandals, hackers, and all the rest of those who wish little more than to tear down what they cannot build. Fortunately, says Dunn, humanity throws up not only its Pol Pots, but also its citizen soldiers who stand at the gates to repel the onslaught, dreaming only of going back to their plows. Sometimes they succeed in their defense of civilization. Sometimes they

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

fail, though when they do the tendency is still for civilization to reestablish itself.

We've had magic swords and magic rings. Now we have magic makeup of all things!

It does seem a little much. Andre Norton's **Scent of Magic** begins with a poor, mistreated scullery maid, Willadene, fleeing the threat of a noisome marriage to the local herbalist's shop. There she stumbles upon intrigue and discovers that she has a talented nose capable of such fine distinctions of aroma that she can literally smell evil. Soon she is attached to the staff of the local princess, Mahart, dispensing creams, ointments, and perfumes while intercepting the efforts of the evil Saylana, who wishes to set her son Barbric on Duke Uttobric's throne, to slip in a perfume or incense that will ensnare Mahart's soul.

Meanwhile, Chancellor Vazul and his familiar, the weasel-like Ssssaaa, plot to ensure the dukedom's safety. Alas, their efforts are not enough. Even as the foreign warrior prince, Lorien, potential groom, potential reinforcement against evil, arrives to meet Mahart, Saylana strikes through all defenses. Mahart is gone, stolen away to the ruins of Ishbi, where an ancient evil waits to devour all.

Can perfume win the day, even with the aid of spunky heroines such as Willadene? This is Andre Norton in action. She is by no means at the top of her form here—*Scent of Magic* is too conventional and predictable to win many new fans—but the novel is adequate fantasy adventure that will surely please old friends.

Bruce Boston's latest chapbook is **Cold Tomorrows**, sixteen poems unified—the author notes with just a whiff of rue—by recency more than anything else. A few have SFFH connections. One—"Not Colonel Mustard . . ."—draws its title from a board game and its meat from Ross Macdonald mysteries.

Some of Boston's poems are more accessible than others—some are indeed quite cryptic—but all are evocative of image and mood. My favorite is surely "You Have Never Seen an Alien," which reminds us that if we really made any effort to understand the Other so common in SF films and on TV, we could hardly slaughter it with such impunity. The same could, of course, be said for war, cowboy, cops & robbers, kung fu, etc., etc., movies and TV shows.

In his preface to **Immortality: How Science Is Extending Your Life Span—and Changing the World**, Ben Bova says that he successfully predicted the Moon Race, solar power satellites, virtual reality, the Strategic Defense Initiative, electronic book publishing, and the discovery of water ice at the south pole of the Moon, among other things. He also says he predicted the discovery of life on Mars, which hasn't happened yet, but his record may in fact be good enough to justify the confidence he displays when he says that people alive today may be able to live for centuries or even millennia.

Certainly, we have learned a great deal about the mechanisms of aging. We have even learned enough to think of repairing damaged telomeres (chromosome ends that shorten each time cells divide), reprogramming the genetic clock, and regenerating body parts at need, not to mention the latest "magic wand" technology, nanotechnology.

Will such things be enough to do the trick? Science fiction would have it so; see Nagata's *Vast* and Dunn's *Full Tide of Night*, above, and Halperin's *First Immortal*, reviewed last November, for three examples.

If they are, should we embrace them? Ben is surely right that it will be impossible to stop research into all the areas related to human immortality and that once an immortality treatment is ready to be used, it will be, first on the rich (of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

course) but soon enough on the rest of us as well. He is confident that the economic, marital, and population side effects will prove manageable, and that humanity's future will be a marvelous one.

Immortality is a nicely done and very optimistic survey of an exciting field of progress. Pick up a copy, and know what to watch for in the news—and in stock offerings.

Ian Stewart is a mathematician and gifted popularizer (and sometimes contibutor of both fact and fiction to *Analog*). He writes the "Mathematical Recreations" column for *Scientific American* (Martin Gardner's old gig), turns out book after book on his favorite topic, and in 1997 was assigned to deliver the 168th Christmas Lectures at the Royal Institution of Great Britain. This lecture series was begun in 1826 by Michael Faraday; today they are televised by the British Broadcasting System which, Stewart reminds us, exists because of Faraday's seminal work on electricity and magnetism.

Stewart's preparations for the Lectures led to **The Magical Maze: Seeing the World through Mathematical Eyes**, an entertaining meander through some of the quirkier, more puzzling realms of mathematics—probability and patterns, chaos and fractals, Turing machines and tilings, logic and optimization theory. It's aimed at those without a great deal of mathematical sophistication, from high school up, and should as advertised expand awareness of the nature of math and mathematical thinking. It might even contribute to relieving the plague of innumeracy that can let a tabloid loudly announce that American men's sperm counts have declined 1.5 percent per year for the 52 years between 1938 and 1990, for a total and tabloidally alarming decline of 78 percent. (If you apply the 1.5 percent correctly, to a constantly declining total, you come out with a 45 percent decline.)

An excellent gift for puzzle fans and budding math whizzes.

Howard DeVore started his list of Hugo and Nebula award winners and nominees in 1970, as a small, stapled pamphlet. It has grown since then—it had to, with another thirty award seasons, the inclusion of the World Fantasy Awards, and a couple of historical essays—and moved from an amateur fan publication to a quite affordable professional reference work, **The Hugo, Nebula and World Fantasy Awards**, current to the 1997 Hugo and WFA and the 1996 Nebulas.

It's the perfect book for settling arguments, seeing if your favorite author ever came close, and checking for dates. Order your copy today. ■

In an instant a stroke can change your life forever

American Heart Association℠
Fighting Heart Disease and Stroke

Reduce your risk factors

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

BRASS TACKS

Howdy!

I always forget whether one is supposed to praise first and complain second or vice versa. I just renewed for two years, so I can't be *too* displeased, right?

Miscellaneous thoughts:

October was hard on the heros—most of them croaked! Mostly good stories, though. I really do like Grey Rollins! I enjoy Stanley Schmidt's editorials, too, although I often find myself mumbling, "I told you so!"

Was "Trade Warriors" Brejcha's first piece? I thought it was pretty good, too, but it had one thing in common with the editorial that I have to howl about. I see in "Brass Tacks" that you were getting beat up about the "he"—"they" issue. That one bugs me, although not often to the point of writing to complain, but another item did, this time, because it occurred twice in as many pages. First, "Fermi Plague" claims that "[a] population may be decimated, but enough will remain to let it recover." Well, I should *hope* that a *ninety-percent survival* would be enough to ensure recovery! It works for the stock market, at least! Then, barely into the second column, "decimated" really goes to the dogs: "after several savage world wars had decimated hundreds of thousands of them . . ." After all, tens of thousands of expired Korthans would be quite a mess to clean up, but it is not possible that "this was a more substantial percentage of the population than similar casualties on Earth" unless they don't count tenths the same way Terrans do.

I hope to see more of Rick Cook, too. While my background is more Scot than Irish (yeah, yeah, I know Scotsmen are second generation Mick imports), and while I figured out O'Carolan's gimmick early in the story, I very much enjoy anything that involves that period and its music. (I'm sort of a half-assed harper, myself.)

Thanks for a good publication!

DWIGHT SCOTT MILLER

Thanks for your comments on the October issue. "Trade Warriors" was Brejcha's first piece in a while, but he's had several here in the past. The phrase "decimated several hundreds of thousands" was an error that was supposed to be corrected and for some reason wasn't; you can decimate a whole population but not its individual members. However, the other usages of "decimate" are correct and do not have the implications you assume. It's true that the word is derived from a root meaning "tenth," but it's been a long time since it was limited to that precise numerical meaning in English!

Dear Dr. Schmidt:

In your editorial, "The Fermi Plague," you conclude, "We need to become a world of people who all have the intelligence, mutual concern, restraint and decency to live together without killing each other even if we have the means to do so." And you go on to ask, "How can we make that happen?"

It seems to me that the obvious answer is a universal educational system that teaches the ethic—and I mean not only understanding of, but commitment

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

to that ethic—of species survival. And to ensure that this education is effective,there must be a really stringent, and automatic, final examination: You either pass it or you die!

Since survival of the human species means survival for us not only of the human race, but of the terrestial biosphere as a whole, I think the philosophical foundation for such an education must lie in the direction pointed out by Albert Schweitzer in his *Philosophy Of Civilization*, which I suggest be adopted as the basic textbook. *Analog* readers and writers might profitably peruse that book.

A. Hugh Jones, Ph.D.
Unclhook@aol.com

Dear Editor,

I was fascinated by your editorial, "The Fermi Plague," in the October '98 *Analog*. You have certainly suggested one way in which an advanced civilization might die. Anthrax seems a possible means, but aren't there a number of instruments which could be used in this same destructive manner?

Evolution invents by trial and error, mistakes fall by the wayside, and it takes a very long time to produce a creature as intelligent as our present-day human being. At first intelligence has a great advantage over trial and error methods, and the intelligent species dashes forward to great success. But the use of intelligence commits the favored species to management, and the species sets out to improve upon evolution, but, at the intelligence level which we have, it is impossible to fully comprehend complex ecological relationships. Many, perhaps even most, apparently intelligent actions turn out to have destructive side effects.

Isn't our situation on the earth today something like that? We have successfully extended the human life-span and brought about a human population explosion. We exhaust aquifers, mine soils, and pollute air and water. We render plant and animal species extinct by the hundreds primarily because we are unwilling to leave room for them. We consume seafood species to extinction or casually destroy their hatching grounds. Much of the destruction is imposed by "improvements" which we expect to make Earth support and even larger number of human beings.

Our intelligence is not sufficient to discipline our greed, our expansionist values, or our suicidal tendencies. We scour the earth with our voracious appetites and breed, breed, breed. Are we going to destroy the earth as a place where human beings are able to live? Or will we merely endure an immense die-off which will leave only a small group of survivors who are regressed back to the stone age? In either case we will no longer send messages to the stars.

Does intelligence contain such a self-limiting factor? In such case, each time an intelligent species emerges anywhere in the galaxy it dies out rather quickly. Then the answer to Fermi's question, "Where are they?" would be, "They were here but they've already gone."

L. Sherbenou, Ph.D.
910 Colby Court
DeKalb, Illinois 60115-4004
(815) 758-7372
esherbenou@aol.com

Dear *Analog*

They may not all be particularly science fictional, but I do have a few suggestions for saving us from self-destruction:

1. The best defense isn't a good offense; it's not to offend in the first place. It's not the least bit helpful to pretend that terrorists don't have understandable motives for their actions, that they're acting out of sheer evil or random insanity. We're plagued with terrorism for a very simple reason: Governments, and to a lesser extent other large organizations, are doing things which make huge numbers of people very angry! Trying to de-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sign a society where many people have motives to commit terrorist acts, but are all somehow thwarted, does not strike me as realistic; the best way to prevent terrorism is to refrain from provoking it in the first place! Regrettably, most politicians would rather do as they please, even if it enrages millions, and then hire more guards. Which relates to my second point:

2. We must learn to recognize dangerous insanity before it manifests itself in destructive behavior. Some sociopaths are born, and some are made, (and we have to learn to stop making them!) but virtually all violent crime, and most other crimes, are committee by that tiny minority. This includes the most dangerous of violent crimes, those committed by governments. There ought to be some way to recognize these people, before they've blown up a building, or started a war!

3. Finally, and most critical, we have to stop keeping all our eggs in one basket. This means getting out into space, and living there in a sustainable way. It means using genetic engineering and nanotechnology to adapt ourselves to every niche we come across, rather than trying to turn everywhere we go into a carbon copy of Earth. And it means reversing the social homogenization we've seen in the last century. Successful species don't remain unchanged and isolated, they expand their territory and diversify!

That said, I don't really buy this notion that the solution to the Fermi paradox lies in intelligent species self-destructing just as they enter space. What we share with hypothetical alien races is our capacity to solve problems, not the details of how we screw up. Surely, if all intelligent races are doing some particular thing, it's because it's the right thing to do, dictated by the laws of physics and the nature of intelligence.

I've even got a candidate for that something: intelligence enhancement! In a Darwinian universe, competition is a given, and there are few circumstances where being smarter doesn't provide a competitive advantage. So if a technology comes along which enables members of a race to boost their intelligence, it's virtually certain to be used, and any segment of society which refrains will cease to influence the destiny of that race.

The likely simplest way to boost intelligence, with only an understanding at the hardware level, would appear to be increasing its speed. There seems to be the potential for five or six orders of magnitude increase, at least, without precluding increases in the scope of intelligence as well. So, is a race of supergeniuses living virtual reality lives a million times faster than human going to have much interest in interstellar travel? When the subjective distance to the nearest star is several million light years? When a single planet could support trillions of them, with light-speed delays encouraging cultural diversity? Will the sort of megaprojects we might detect at astronomical distances be undertaken, when a one-minute investment is considered long term? Perhaps not.

Moreover, if such a race does expand into interstellar space, it would do so gradually, utilizing Oort cloud resources, where the temperatures are more friendly to high speed computation. By the time they reached the next star, deep space would be their natural environment, and they might never bother coming near enough to a star to encounter water-based life like us.

Anyway, that's my answer to the Fermi paradox: About the time a race can seriously attempt interstellar travel, it develops the ability to change its own nature, and does: into something less expansionistic, and far less observable. It's good-bye to interstellar empires, but at least it's not a pessimistic scenario!

BRETT P. BELLMORE
8734 Burt Rd.
Capac, MI 48014
(810)724-5924 home
(810)798-3922-265 work

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Dear Dr. Schmidt,

I have just read Paul Urayama's chilling tale "Living In A Stranger" in the October issue. I say "chilling" because it mirrors a real-life condition. Dr. Oliver Sacks, in his book *The Man Who Mistook His Wife For A Hat*, describes two individuals who could only form short-term memories. In chapter two, "The Lost Mariner," we meet a man who can only manage about three minutes of memory. Chapter twelve, "A Matter of Identity," tells of a man with perhaps a twenty-second memory. The implications are profound and disturbing. Thank you, Mr. Urayama.

Jon Glazer
jon@sisqtel.net

The author replies. . . .

Thank you for your message regarding "Living in a Stranger." While I haven't read Oliver Sacks' book yet, the story was inspired by another real patient named Henry M., who now lives near MIT, I believe. In 1953, he was subject to an experimental lobotomy, leaving him with no long-term memory.

The humanity of such a condition intrigued me, but writing about a person unable to reflect on recent events was difficult, hence the notion of a sleep-induced loss. I think a lot of our humanity is due not only to our ability to reflect and remember, but to the feeling of continuity, in feeling that it was me who did this or that. The prospect of losing that is indeed chilling.

Paul Urayama

Dear Dr Schmidt,

Stephen Gillett's article on nanotechnology was very interesting, but there are some points that he might have included. For example, any nanodevice that could work on sewage and other biological waste is probably going to be capable of working just as well on biological entities that we don't (at present) call waste, such as any living body of an animal or plant. If we are not careful, our waste disposal could dispose of the whole biosphere. It could also be seized upon by megalomaniac nuts who see a cheap Weapon of Mass Destruction and do not see the danger to themselves; or by simple nuts who see it as their religious duty to clear Creation from Sin, or psychotics, et cetera, et cetera.

Before we plunge with enthusiam into nanodevices that act on biological entities, perhaps we should look into a few other things. For example, blow flies lay their eggs on dead bodies, and do it within minutes of death, though you rarely see one near a living body. How do they recognize death—obviously from some distance, too? Now, if we could discover how they do it, we could try to design our nanodevices so that they would act only on corpses. Of course, that might lead to some argument with people who have established funeral customs; but it may be possible to find ways around that. But I suggest that before we do anything that could conceivably threaten the living, we should put some real effort into learning what is the real difference between the living and the dead. It is not just that things start to decay—that is something that follows death, it does not define it. Blow flies know, so why don't we?

Roderick Rees

Dear Dr. Schmidt:

I am amused by what people consider to be change. One of your correspondents in the October issue is irritated by the "change" to using "they" as an indefinite singular pronoun, another objects to "transient political fad," and you write that this use of "they" is increasingly accepted. What is so amusing is that this change occurred more than six hundred years ago. Except it wasn't change, because the words seem to have been born with that usage. Why is it still in dispute?

Can any of the objectors document any period in its history when "they" was *not* used as an indefinite singular

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

pronoun? I believe the notion that "they" is a plural pronoun is mistaken, for the simple reason that it has *never* been used solely as a plural pronoun. Since its birth, it has been used as both singular and plural.

I suppose the grammarians who assert these pronouns are only plural are driven by the human desire to impose order. Many regularities do work their way (or ways?) into our language, for regularity is certainly useful and a relief to the memory. But that does not justify an attempt to proclaim regularity where it does not exist. Even though "themselves" may be plural in construction, English does not always obey rules, and the facts tell us that these pronouns are and always have been used in the indefinite singular.

I also dispute the notion . . . that "he" is a previously accepted, all-purpose indefinite personal pronoun. While it may have enjoyed overt acceptance, it led a covert life. Few people hearing a nurse unfamiliar to them referred to as "he" will assume the nurse is at all likely to be female, so "he" isn't indefinite for that purpose, along with others.

EDP (ERIC POSTPISCHIL)

Dear Dr. Schmidt,

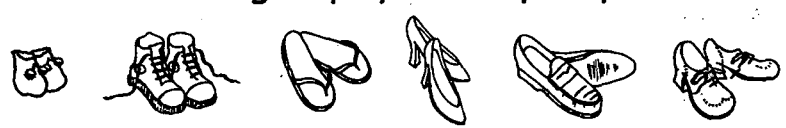
With regard to Joseph E. Quittner's letter in the October, 1998 issue on the use of "they" as an indefinite personal pronoun, I feel compelled to pluck a particularly misguided canard which Mr. Quittner repeated. He, like certain others, contends that this usage is due to a "transient political fad." However, it is a normal usage in my native dialect of English, as well as in my parents', grandparents', and presumably that of many generations before them. Undoubtedly though, Mr. Quittner, having set himself up as the *arbiter elegantiae* for the English language, considers me and my forebears to be just the sort of ghastly barbarians who would try to sneak our "ghastly barbarism" into his language, so I resort to a more imposing authority, the Oxford English Dictionary.

The OED (2nd ed.), in the entry for "they (2.)," cites eight different examples of this usage going as far back as the year 1526. Perhaps the opponents of the usage do intend to find the roots of "PC" in Tudor England, but until such a thesis is proven, it seems their analysis of the usage is somewhat flawed. As for its use in *Analog*, if someone wants to deal with the twenty-first century and beyond, it seems as though they should at least be able to deal with the developments of the sixteenth.

I also hesitate to credit a prescriptive pronouncement accompanied by such a "barbarism" as "let it be to me, if not thou." Not to thee, Mr. Quittner.

BEN BUCKNER
Ghastly Barbarian

Our free Catalog helps you every step of the way.



Great consumer information is a shoe-in with our free Catalog. Call toll-free 1 (888) 8-PUEBLO. That's 1 (888) 878-3256. Or go to www.pueblo.gsa.gov.

U.S. General Services Administration

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

CLASSIFIED MARKETPLACE

Advertise in the World's leading science fiction magazines with our Analog/Asimov's combined classified section. Ad Rates per issue: $2.95 per word (10 word minimum), $125 per column inch (2.25 inch maximum). SPECIAL INTRODUCTORY OFFER: Buy two issues and receive a third issue FREE. Send orders to: Dell Magazines, Classified Department, P.O. Box 1510, Clearwater, FL 33757-1510. Direct inquires to: (800) 237-9851; Fax (727) 445-9380.

ASTROLOGY

EMPOWER YOURSELF through Earth's religion. Free Protective Pentacle. The School of Wicca, P.O. Box 297 T, Hinton, WV 25951-0297.

AUDIO/VIDEO

AUTHORS

ATTENTION AUTHORS. Established publisher with international offices can arrange the editing, publication, promotion, warehousing and distribution of your book. Pentland Press, Dept. EQ, (800) 948-2786.

BOOKS/PUBLICATIONS

BUYING SCIENCE FICTION magazines, book collections. Will travel for large accumulations. Bowman, Box 167, Carmel, IN 46082.

ENTER THE WORLD OF *THE SHIMSARA,* where ancient mysteries and modern technologies set a new stage for the timeless battle between Good and Evil. Two science fiction/fantasy books published in one stunning 700-page volume. Includes maps, glossaries, and instructions for two new games. Send $20 check or money order to: Jan Whiteley, 11019 Becontree Lake Dr., #301, Reston, VA 20190.

100's OF PULP MAGAZINES and reprints pre-1925. Catalog $5.00. Francis Fonda, P.O. Box 141, San Leandro, CA 94577.

VINTAGE SF PAPERBACK ORIGINALS, first editions, search services. Send your "wish list" – Kirk's Collectables, P.O. Box 387, Denville, NJ 07834.

FREE AD OFFER IN OUR MAGAZINE COMBO

NEW CLASSIFIED OFFICE

Take advantage of placing a classified ad in our next two issues and receive a third ad FREE!

Your ad will reach loyal Science Fiction readers in both **ANALOG SCIENCE FICTION & FACT and ASIMOV'S SCIENCE FICTION.** Start your schedule with our next issue to receive your FREE ad and also benefit from our new low rates.

Call today for a new rate card.

Dell Magazines • Classified Department
P.O. Box 1510 • Clearwater, FL 33757-1510
(800) 237-9851 • Fax (727) 445-9380

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

UPCOMING EVENTS Anthony Lewis

4–7 March 1999
WORLD HORROR CONVENTION 1999 at Atlanta Marriott, Atlanta, GA. Guests of Honor—Michael Bishop, John Shirley, Neil Gaiman (TM), Lisa Snellings. Registration—$75 until 15 February 1999, $100 at the door, $25 supporting. Info—World Horror Convention '99, Box 148, Clarkston, GA 30021-0148; e-mail—horrorcon@aol.com; URL—www.worldhorror.org

5–7 March 1999
LUNACON '99 (New York City area SF conference) at Rye Town Hilton, Rye Brook, NY. Guest of Honor—Vernor Vinge, Artist Guest of Honor—Bob Eggleton, Fan Guest of Honor—Anthony Lewis. Info: Lunacon '99,PO Box 3566, New York, NY 10008-3566; e-mail—lunacon@lunacon.org

17–21 March 1999
20th INTERNATIONAL CONFERENCE ON THE FANTASTIC IN ARTS (academic SF conference) at Ft. Lauderdale Hilton, Ft. Lauderdale, FL. Guest of Honor—Brian Aldiss; Guest—Kim Stanley Robinson. Info—IAFA, College of the Humanities, 500 NW 20 St., HU-50 B-9, Florida Atlantic University, Boca Raton, FL 33431. (954)475.6747.

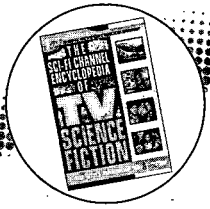
2–6 September 1999
AUSSIECON THREE (57th World Science Fiction Convention) at World Congress Centre, Melbourne, Australia. Guests of Honour—George Turner (in memoriam), Gregory Benford, Bruce Gillespie. Registration—$155 (A$200); supporting $35 (A$45)until 1 January 1999. [These are the latest posted rates as of the time this column went to press. Rates may go up after 1 January 1999.] This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Info—Aussiecon Three, GPO Box 1212K, Melbourne VIC 3001, Australia. US Agent—PO Box 266, Prospect Heights, IL 60070-0266. URL—www.aussiecon3.worldcon.org

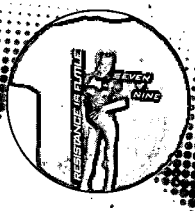
4–7 November 1999
WORLD FANTASY CONVENTION/VOYAGES at Rhode Island Convention Center, Westin Hotel, Biltmore Hotel, Providence, RI. Guests of Honor—Patricia A. McKillip, Charles de Lint, Robert Silverberg, Leo & Diane Dillon; Special Guest—Samuel R. Delany; TM—John M. Ford. Registration—$85 until 30 November 1998, then more (limited to 850); $35 supporting (payable to MCFI). Info—World Fantasy Convention, c/o MCFI, Box 1010, Framingham, MA 01701-1010. fax— (617) 776-3243 e-mail—wfc@mcfi.org; URL—www.world.std.com/~sbarsky/wfc99.html

Convention runners: If your convention has a telephone, FAX, e-mail, or Web page URL, please let us know so that we can publish this information.

Convention attenders: When calling conventions for information, do not call collect and do not call too late in the evening. It is best to include a S.A.S.E. when requesting information; include an IRC if the convention is in a different country.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED





Looking for the World's Largest Selection of Science Fiction Merchandise?

Find it online @

scifi.com/store

We offer Rare Collectibles,

Limited Edition Specials,

Exclusive Comics, Apparel,

Music, Books, Gifts, Games

...Plus Much More!

SCI-FI CHANNEL

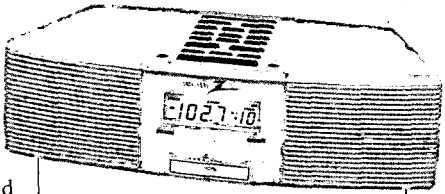
© 1998 USA Networks

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

TECHNOLOGY UPDATE

Big sound from a stereo radio—without the big price!

Zenith Audio, a leading electronics manufacturer designs a "Small Footprint," "Big Sound" stereo system and drives the price below $100.



Zenith Audio has developed a Digital Stereo Clock Radio that boasts the acoustic quality and practical features of stereo radios four times as expensive. You'll be amazed at the sound quality and powerful bass you get from a radio this small and this affordable. This stereo radio features an 11-key handheld remote control and an input jack for CD players or other audio sources.

Loaded with features. The AM/FM radio features digital tuning for pinpoint reception and crystal-clear sound. The STEREO indicator allows you to tune in to the stereo signal. It also picks up TV and WEATHER signals with 13 TV channels and 7 Weather channels, so your Zenith Audio Clock Radio is a great source of news, entertainment and information. You can program the unit's memory for 37 preset stations, and the tuning buttons can operate either manually or in a automatic search mode.

Practical functions. The backlit clock has several alarm functions, so you can wake to either radio, TV, weather or a buzzer. The sleep timer allows you to fall asleep to up to 90 minutes of music, TV or weather and then shuts off automatically. In the morning, if you need a few extra minutes of sleep, press the SNOOZE bar on the control panel or on the remote. The radio or alarm tone stops for 10 minutes and then sounds again. The unit's battery backup system will maintain the time, alarm and preset station memories in the event of a temporary power interruption.

Micro-Electronic Sound Breakthrough

State of the art stereo sound quality in a stylish cabinet

- AM/FM/TV Bands
- Stereo Speakers with Crystal Sound System
- Digital Weather Band
- 37 Preset Station Memories
- Ascending Tone Alarm
- Wake/Sleep to Radio, Weather or TV Band
- "Fail-safe" Alarm System

Factory direct risk-free offer. You can spend hundreds of dollars more on a stereo radio, but why do it? We get the Stereo Clock Radio direct from Zenith and pass the savings on to you. This product comes with a one-year manufacturer's limited warranty and Comtrad's exclusive risk-free home trial. If you are not satisfied for any reason, simply return it within 90 days for a full "No Questions Asked" refund.

Zenith Crystal Clear Stereo. .$99.95 $12 S&H+

Please specify white or black.

Please mention promotional code **4242-14650.**

For fastest service, call toll-free 24 hours a day

800-992-2966

DISCOVER NOVUS VISA MasterCard American Express Optima Cards

To order by mail, send check or money order for the total amount including S&H. To charge it to your credit card, enclose your account number and expiration date.

Virginia residents only—please include 4.5% sales tax.

comtrad industries

2820 Waterford Lake Dr., Suite 102
Midlothian, Virginia 23112

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED